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THE VITAL STATISTICS OF THE CENSUS OF 1900.

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Introductory.

The apparently impossible has been accomplished within two years of the taking of the census, and the two volumes containing the essential facts regarding human mortality in the United States have been published and distributed. When we recall that the first volume of vital statistics of the Census of 1890 was not distributed until 1896, and that the last was delayed in publication until 1898, the successful conclusion of the efforts of Mr. W. H. King, Chief Statistician of the Division of Vital Statistics, is a matter for public congratulation. For the first time in the history of the census the vital statistics are available at a period when the facts and conclusions can be applied to the solution of present-day problems; and the volumes, therefore, take their well-deserved place as a most useful contribution to the science of vital statistics in the United States. Only those who have been engaged in similar undertakings can fully appreciate the great technical difficulties to be overcome in the preparation of a volume containing a large number of computations derived by an intricate analysis from an enormous body of individual facts. It is not going too far to say that

Part I of vital statistics forms a work of reference for American health officers, physicians, sanitarians, and students of social problems, assuming for this country the place of Newsholme's "Vital Statistics" for the United Kingdom.

Future Annual Reports.

The promise is held out that, under the permanent organization of the Census Office, annual volumes on vital statistics will be published; and it would seem to the writer a question of the greatest possible importance that the expressed wish of Mr. King, in his circular letter, for full and candid criticisms and suggestions should be carried into effect. It is with this end in view, and with full appreciation of the eminently useful services performed by the Chief Statistician, that the following criticisms and suggestions have been brought together. Dealing with a work of such vast proportions and a large number of exceedingly complex, interrelated facts, it has only been possible to do justice to the most important aspects of the problem; but it may be added that the views expressed are based on a careful and painstaking study of vital statistics in this country extending over a period of nearly twenty years, and including a familiarity with nearly the entire body of published reports and observations on mortality in the United States.

Evidence of Indifference to Expert Suggestions.

Mr. King seems to have given little, if any, consideration to the recommendations and suggestions of qualified members of the Special Committee of the American Economic Association on the Methods and Scope of the Twelfth Census; and in a general way the "make-up" of the volumes, the arrangement of the tables, the nomenclature of the diseases and the analytical treatment, combined with the graphic illustrations, are a non-critical repetition of Dr. Billings's methods in the reports of the Eleventh Census. The valuable suggestion by

Professor Fisher that the census of 1900 should contain a critical review of all the mortality statistics of value in the United States was not adopted; nor is there any reference whatever to the earlier census publications on vital statistics, especially the report of De Bow, who first introduced national vital statistics into the Census of 1850.* The well-founded advice of Professor Fisher that the editor of the volumes should "insert short catch-titles for the tables and in general make tables of contents and indexes more usable" was entirely disregarded; and the work in this respect is even inferior to the confusing methods adopted in the volumes of vital statistics of the Eleventh Census. Whatever information is sought must be obtained at a considerable expenditure of time and effort, while the method of making page and table headings proves a source of irritation. To the general public and to the increasing number of medical experts who make practical use of vital statistics the census volumes will on this account prove an exceedingly difficult work of reference.

The Value of Enumerators' Returns.

At the outset, in the introduction to Part I, attention is called to the useful nature of the enumerators' returns. Contrary to the view expressed by Professor Fisher, that the cause of vital statistics would be better advanced by the omission of all enumerated deaths, it is conclusively proven by Mr. King that through the results of enumeration the registration records of States and cities have been materially, and in some instances very materially, improved. Thus, for instance, the number of deaths returned by the registration record of Essex County, New Jersey, was 13 per cent. less than the actual number, as shown by the census enumeration, there having been ninety-nine more deaths than were recorded in the office of the Secretary of the State Board of Health.

* A very interesting contribution to the practical use of census vital statistics will be found in Archibald Russell's "Principles of Statistical Inquiry as Illustrated in Proposals for Uniting an Examination into the Resources of the United States with the Census to be taken in 1840."

Another illustration is the county of Clinton, New York, where the registration returns gave only 60.5 per cent. of the total deaths as ultimately established upon supplementary information furnished by the enumerators' returns. These illustrations will show the auxiliary value of a system of enumeration as a check upon the accuracy of registration returns and as a means toward a more complete statement of the actual mortality of a given State, district, or city.

Decline in Value of American Registration Reports.

It may not be out of place briefly to comment upon the evidence furnished in the Introduction that there has been in many directions a decline in the efficiency and value of local registration and the publication of results. It is most unfortunate that the American medical press is not sufficiently critical of the contents, nature, and object of local health reports, which, in large numbers, must be received for review. The writer recalls practically no instances of importance in a careful scrutiny of two leading medical journals during a period of ten years in which attention has been called to the inadequacy of local reports and the misleading methods employed by local registrars. It would take up too much space to discuss the matter on this occasion, but a few instances of flagrant abuse and unquestionable decline in efficiency may be pointed out. For some years previous to 1895, under the active efforts of the late Dr. Cochrane, a series of useful, if not entirely accurate, reports on the vital statistics of Alabama had been issued. Since the death of Dr. Cochrane (in 1896, I think) no reports have been issued. For Mobile, Ala., no local reports have been issued since 1894; for Chicago, Ill., none since 1898. For Philadelphia no detailed reports regarding the mortality by cause and age were published in 1897–98; and for Buffalo, N.Y., no reports have been published since 1886. For West Virginia no reports were published for 1897 and 1898. For Pittsburg, Pa., no report will be issued

for the year 1901, since the city council has refused to appropriate the necessary funds. The same is true for Kansas City, Mo.; and for a similar reason no report was published for California for 1897–98. For the city of Denver no health report has been published since 1898. For Knoxville, Tenn., after a continuous publication of reasonably useful and accurate reports for twenty-one years, the publication was suddenly suspended in 1894, no report was published for 1895, the publication was resumed in 1896, since which date no annual reports have been printed or given to the public.

For some unaccountable reason the registration reports of Vermont, which for forty years had been issued with a reasonable degree of uniformity and accuracy, were suddenly changed in 1897; and all information relative to the causes of death by ages was omitted. It is difficult to understand the liberty which is thus taken with registration reports on the part of registrars or other State officials. By what right and for what reason any State official can take it upon himself to alter the fundamental data pertaining to the vital history of the State or city is beyond the understanding of the writer. Thus forty years of effort and a large amount of expense for the State of Vermont have practically been wasted, in that all future reports will lack the fundamentally most important data of health and longevity; namely, the mortality from different diseases at different periods of life. This does not at all imply that the reports for Vermont have been exceptionally useful, since they have always fallen materially short of what such reports have been in the States of Massachusetts, Rhode Island, Connecticut, etc.; but how so serious an omission as the ages at death by specified causes could be made is simply evidence of the gross ignorance which still prevails in this country regarding the fundamental character of vital statistics and the utility of such data, if properly prepared and placed before the public. Nor is there to be found in American public health reports a

distinct recognition of even the elementary principles of vital statistics, as laid down by Farr, Newsholme, and others. In other words, there appears to be no clear recognition of the real local value of such reports, of their public utility and their greatest possible usefulness.

There is, therefore, an exceptional opportunity before Mr. King to make his annual reports a model to be imitated by local registrars; and public attention should constantly be called to defects in reports of States and cities, which, indeed, is a most necessary but ill-discharged function of medical journalism in the United States. It is nothing to the credit of large American cities, like New York, Boston, Chicago, etc., that their vital statistics and published reports should by degrees have fallen into disuse instead of being constantly improved, as is the case in England, where the local reports of thirty-three towns are models of their kind, of great public usefulness, highly respected, constantly referred to in medical literature, and, finally, a worthy supplement to the annual reports of the Registrar-General. The one notable exception for the United States is the report of the Superintendent of Health and Registrar of Vital Statistics of Providence, R.I., issued annually since 1856. Care should be taken by the Census Office to arrange the future reports so that they shall deal rather with the United States as a whole and set forth general laws of mortality and disease prevalence by general divisions than, by giving too much local information, assume the place of local reports on the health and vital statistics of the different communities. Such reports, if intelligently prepared, are absolutely essential; and the need thereof should be more generally recognized by the medical press of this country. It is a melancholy fact, to one who is familiar with the history of American vital statistics, to note the many wrecks on the shore of time left behind in a few scattered reports for States and cities where once a good beginning was made, only to be abandoned after the initial factor had passed away. Usually

it is a one man's work, the value of which is scarcely recognized by the general community, ill-paid and ill-considered, while the results are printed only after much difficulty, if at all. Thus, once upon a time, South Carolina, Georgia, Kentucky, Illinois, and Iowa had registration systems which could have been developed to great usefulness; but the subject was permitted to lapse, and the reports are now curiosities in statistical and mortality literature. If the work of Mr. King does nothing else than to bring before the American public the great utility of vital statistics in determining local conditions predisposing to ill-health at different periods of life, with their causes properly localized, they will form one of the most valuable contributions to the knowledge of the present age.

General Criticism of Scope and Method.

For some peculiar reason the maps showing the disease prevalence in registration States are limited to five diseases, while thirteen maps are devoted to an exhibit of the disease prevalence in different sections of the United States on the basis of ratios of specific diseases to the mortality from all causes. It would have been better to have omitted the maps showing the mortality from influenza in the registration States, and instead thereof to have given maps showing the mortality rates from malaria, pneumonia, and suicide in the area for which accurate information is available. The use of ratios is of very limited value, and likely to lead to serious abuse on the part of those who for local reasons wish to prove one section more healthful than another.

The final section (Tables 20 to 28) of Part I, entitled "Ratio Tables," includes a number of rate tables; and the title is, therefore, misleading. This inadequacy of headlines and catch-titles is met with throughout the census volumes, leading to confusion, and causing great difficulty in making the volumes of practical utility. Thus it requires careful study, on the part of even those who are reason-

ably familiar with the subject, to determine the exact meaning of the different tables as indicated by the head-lines, which, in most instances, are very inadequate, and sometimes misleading. Table 23, for example, showing "Number of deaths at each age per 1,000 deaths at known ages," fails to indicate that it refers to the mortality by sex, color, and birthplace of mothers. Table 24, showing the "Number of deaths at each age per 1,000 deaths at known ages from each cause," is one which is most likely to be misunderstood by those who are not familiar with this otherwise very useful method of showing the distribution of deaths at different periods of life. It would perhaps have been better if a column had been added, giving the unit of 1,000 for each disease, to indicate exactly the method employed; namely, to show for every 1,000 deaths from each disease the number occurring at each divisional period of life. Table 25, showing the "Number of Deaths from Each Cause per 1,000 Deaths from Known Causes at Each Age," should also have given the unit of 1,000 in the first line underneath the period of life to indicate exactly that what it is meant to show is the proportion of deaths from each specific cause occurring at each divisional period of life. Since this statement of facts is exactly the opposite of the preceding, but one with which the general public is hardly familiar, the tables, without some textual explanation, are likely to be understood by only the very small number of those who have made a study of vital statistics. But the most serious objection against these tables is the omission of detailed information regarding the number of deaths in the registration area by divisional periods of life in identically the same manner as the data are given in the form of ratios. It is difficult to understand why such an enormous amount of labor was expended upon the calculation of ratios of extremely limited usefulness when accurate rates per thousand living could have been as readily calculated and given to the public. For reasons best known to those in charge of the

work the death rates for the registration area are given only for eight periods of life, whereas the ratios are given for twenty-five periods of life; yet much more useful results would have followed if exactly the opposite method had been adopted,— namely, to give twenty-five periods of life for each table of rates per thousand living, and eight periods of life for each table showing the ratios of deaths from different diseases at different ages.

A very useful note is appended to some of the fundamental tables in Part I, referring the reader to fundamental tables in Part II, where the original data regarding deaths can be found. It would have been desirable to have given similar information regarding the population data, and in addition some textual explanation as to the methods employed, with examples so prepared that even the reader but superficially familiar with vital statistics could readily understand the difference between the rates and ratios given in the final tables of Part I.

Repetition and Duplication of Facts.

Limiting the rates to registration areas, separate returns are given for five subdivisions: namely, registration cities as a class, registration States, registration cities in registration States, rural sections of registration States, and registration cities in non-registration States. There has thus been duplication of results and a great waste of space, time, money, and opportunity in this repetition of practically identical series of facts. To illustrate this point, it is only necessary to consider the general death rate of males, which shows as follows: registration record, 19.0 per thousand; registration cities, 20.0 per thousand; registration States, 18.1 per thousand; registration cities in registration States, 19.8 per thousand; rural sections of registration States, 15.8 per thousand; registration cities in other States, 20.2 per thousand. There are, therefore, included in registration area generally three separate groups returning practically identical results, as

follows: 20.0, 19.8, and 20.2 per thousand. This subdivision is carried through the entire census volume, causing endless confusion, and serving, as far as the writer can judge, no useful purpose except the one of showing, possibly, the greater accuracy of the returns from registration cities in registration States. In any future report of this kind it would seem that the results need only be shown for the registration area and separately for registration cities and registration rural sections. This would give three divisions instead of six, and practically cut down the work and this volume of the census by as much as one-third, if not more.

Inadequate Population Data.

Section II, on population, contains a table on page xlii giving the details of the population by ages and classes. This table is defective in that it does not give the details regarding the ages of the Indians, Chinese, and Japanese, but includes these nativities in the general term "colored"; nor, as will later be pointed out, is this fundamental basis for subsequent rates given in any other part of the volumes on vital statistics and population. The ages are given by ten-year periods from fifteen to forty-four, a twenty-year period follows to sixty-four, while ages sixty-five and over are given in the aggregate. This method is faulty; for the facts should have been given by ten-year periods throughout, certainly to age seventy-five. Ages under one year are given separately, but again included in the period under five. This method also is faulty in that the population should have been given for ages 0–1 and 1–4, thus affording a definite measure of the mortality at two well-defined periods of life. The only argument in favor of the method adopted is that it follows precedent, and coincides with the English tables, giving the mortality at ages under five only. This objection could have been readily overcome by the publication of the population and mortality data by single years under five and by five-year periods after this age, thus making it possible for any

one to form his own age combinations in whatever way required.

Births and Birth Rates.

Section III, dealing with births, forms a very useful contribution toward our knowledge of an exceedingly important subject, even though most of the conclusions are hypothetical and based on estimates and theoretical assumptions. Generally speaking, the conclusions have been arrived at with care; and the results are reasonably approximate to the truth. Thus, to quote one significant statement, the average annual rate of increase by excess of births is shown to be only 19.5 per thousand for those of native birth and native parentage against 36.5 per thousand for those of foreign parentage. The rate of increase for the colored was slightly less than that for native white parents, being estimated at 17.8 per thousand. An even more significant fact, however, is pointed out relative to the birth rate in the Northeastern States, where the average annual increase of those of native parentage is represented by only 3.8 per thousand against an estimated increase of 39.6 per thousand for those of foreign parentage. Natality forms an almost neglected chapter in American vital statistics, while yet a subject of profound interest and far-reaching practical importance.

Fecundity of Native Women.

In the Census of 1890 inquiry was made for the first time, of all women who were or had been married, as to the number of children born to them, and the number of these children living at the time the census was taken; but, unfortunately, no tabulation of these data was made, it is stated, for want of time.* Thus a series of facts of the greatest sociological and political value were kept from the public; and the Census Act in this respect was disregarded for reasons unknown.

*A similar inquiry was made in the Census of 1900 (Population Schedule No. 1, cols. 11 and 12); but thus far the results have not been made public.

An inquiry of this kind was made by the census of Massachusetts in 1885; and results of considerable value were published in Volume II on social statistics. It was there shown, for instance, that of native married women of native birth 20.2 per cent. were without children, while of married women of foreign birth only 13.3 per cent. had never had children. For reasons equally perplexing no similar inquiry was made by the Massachusetts census of 1895, yet it is not going too far to say that, in the vast amount of statistical data pertaining to every conceivable aspect of the life of the population, no branch of inquiry could possibly be of greater importance than the fertility of native-born women of native parentage, the proportion of children to the married, the proportion surviving, etc., in comparison or contrast with similar facts for those of foreign parentage, destined in course of time to increase and multiply out of all proportion to the growth of the population of what may properly be called "native stock."

General Death Rates.

Sections IV and V deal with general death rates. Unfortunately, the fundamental facts regarding deaths by ages and classes have not been given in this section in a manner to correspond with the table of population. It must always be kept in mind that the deaths for the registration area and its subdivisions by States, cities, and rural sections form a separate body of facts, a thing totally apart from the general census data relating to population and deaths for the United States as a whole; and the first fundamental principle of any census analysis should be that no rates be published for which the corresponding actual data are not given in identically the same manner. As will be pointed out later on, the most serious defect of the census volumes on vital statistics is that a large amount of analysis is given to the public without the publication of the corresponding actual facts as to population and deaths, making it impossible for the

critical reader to verify the accuracy of the rates or to determine the value and importance of the rates by the number of observations upon which the conclusions are based. The importance of this criticism will become more apparent upon considering the subject in a little more detail, for, as Mr. King points out, "In this country there are such marked differences in the composition of the population of different States and cities that certain primary characteristics of the population must be taken into consideration in comparing the general death rates with each other or with those of foreign countries or cities." While this point is readily admitted, the data themselves, making possible a thorough analysis and a rearrangement of different series of facts, are not given to the public; and they might, therefore, as well never have been collected. This is illustrated more fully in considering Section VI, where color and race in relation to deaths are discussed.

Race Mortality.

The crude death rates of five races are given for the registration area respectively as 17.3 per thousand for whites, 30.2 for negroes, 22.8 for Indians, 18.8 for Chinese, and 10.3 for Japanese. These death rates are misleading, and not comparable with one another as regards the Chinese and Japanese populations, which are almost entirely of adult ages,* and subject to a radically different mortality experience; and the rates given on page lxx, showing the mortality from certain causes by race and per hundred thousand of population, are equally misleading and practically worthless. If no other method could have been devised, the rates should have been deduced from the population, ages fifteen and over, and been limited to diseases affecting adult life. For instance, the conclusion that "the death rate of the Chinese from consumption (656.8) was very much higher than that of the

*The proportion at ages twenty to sixty of the population at all ages is 88.6 per cent. for the Chinese, 78.4 per cent. for the Japanese, 42.3 for the Indians, and 45.6 per cent. for the native whites of native parents.

Indians (506.8)" is, in all probability, a misstatement of the facts, since the Indian population contains a large proportion of children under 5 (Indians, 14.5 per cent.; Chinese, 1.3 per cent.), among which the actual number of deaths from consumption is proportionately small. Death rates for the population of different races should have been given by age periods, in the same manner as given for the population by parentage on page xlii of the Introduction.

Omitted Fundamental Data of Population Distribution by Age and Race.

Another serious impairment of the value of the vital statistics is, however, the complete absence of the original facts relative to the population and deaths of the Chinese, Japanese, and Indians living in the registration area. By a curious arbitrariness, facts have been included and excluded, apparently without reasonable excuse. Thus, for instance, one would expect to find this information under Table 6, in Part II, where the deaths at each age by sex, color, and nativity are given; but the term "Colored" includes all races other than white, and, though the most elaborate details are given by sex and birthplace of mothers for the white population, no such information is given for the negro, Indian, Chinese, and Japanese populations. The data are given in some detail in Table 9, which, however, is for the United States as a whole, and not for the registration area. Here, again, for some arbitrary reason the data are only given for the colored as a group, and for the Indian and Chinese population, making it impossible to determine accurately the negro mortality and that of the Japanese. Table 10, which gives corresponding information of deaths in the registration area, only considers the colored as a group and the Chinese, making no mention of the negroes separately, of the Indians, and of the Japanese. While information is thus available for the deaths of the Chinese in the registration area by ages and causes, with distinction of sex, none is published

relative to the corresponding population of Chinese in the registration area. Population Part II, Introduction, Table 21, gives the age distribution of the Chinese population, but only for the United States as a whole, and not for the registration area. Similar criticisms apply to the other races and to their combinations, and it is impossible to reconstruct the misleading tables given in the analysis. An accurate knowledge of the mortality and disease liability of the Chinese, Japanese, and Indian populations, is therefore impossible. This is a matter much to be regretted, since the data were evidently available; and they should have been given to the public rather than a large amount of useless repetition by subdivisions of registration areas and analysis based on gross death rates of very limited determining value.

Mortality by Nativity and Birthplace of Mothers.

Section VI also considers the mortality by general nativity and parent nativity and birthplace of mothers, and rates are given for a very large number of registration cities. Here, again, the rates are not given by age periods; and they are, therefore, in many instances, misleading, showing, for example, a foreign white mortality for Frederick, Md., of 45.6 per thousand; for Fresno, Cal., of 9.8; and for Jacksonville, Ill., of 61.1 per thousand. It is difficult to understand why these rates were included in the analysis, since Mr. King pointed out in the Introduction that only rates and ratios having a uniform numerical basis would be given, and that unsatisfactory rates and ratios would be omitted, but that the omission would be indicated by an asterisk. This table of death rates by color, general nativity, and parent nativity, could have been made of real value if the rates had been given in the same manner as the mortality rates for cities by age periods in Section VII.*

*An illustration of the practical value of these statistics will be found in a paper by the writer on "Race and Mortality" in the *Medical Examiner*, New York, October, 1902.

The Relation of Age to Mortality.

Section VII discusses the relation of ages to deaths. While the relation of age to mortality is, without question, the most important factor to be considered in any analysis of vital statistics, the complex and heterogeneous character of the American population necessitates due consideration of race and nativity in its relation to age. While the table of death rates here given for a very large number of American cities, by eight periods of age, is the most valuable contribution ever made to American vital statistics, it falls materially short of its greatest utility by the unfortunate omission of death rates by color and nativity in cities where the former or the latter is of importance. The death rates by cities are the first complete statement ever made in American vital statistics of the comparative mortality of American urban communities with due regard to divisional periods of life. Only those who for years have had to content themselves with the badly arranged individual health reports of different cities can appreciate the value of this table, which in course of time must become the fundamental basis for all accurate comparisons of the mortality rates of American communities.

Crude Death Rates.

It is of the utmost importance that due regard should be given to inherent fundamental differences in the elements of the population of American cities, so that no serious injustice may be done to the interests of different communities. To illustrate this point, I may quote the rates given for New York City and New Orleans, showing that at ages twenty-five to thirty-four the mortality rate is 10.7 per thousand in the former against 20.1 per thousand in the latter; but, manifestly, since New York has a negro population of only 1.8 per cent. against 27.1 per cent. for New Orleans, it is grossly unfair to compare the two cities in this manner, even though it would have been found, on more careful analysis,

that the white mortality of New Orleans considerably exceeds the mortality of New York. The actual differences, however, are not represented by the rates given.

Specific Death Rates.

Too much emphasis cannot be put upon this point, as one upon which hinges the entire future of American vital statistics; namely, the primary consideration of the elements of the population in different communities with due regard to age and sex. Whatever may be said against the use of crude death rates, which are as misleading as they are generally applied to unworthy purposes, applies with special force to specific death rates for different periods of life and for cities where other race elements than the native white go far toward the making up of the larger part of the population. To carry this point a little further, I may quote the death rate at the age period 25–34 for Natchez, Miss., given as 35.1 per thousand, against a death rate of only 9.0 per thousand for Newark, N.J.; but Natchez has a negro population of 58.1 per cent., whereas that of Newark forms only 2.7 per cent. of the total. It is this indifference to the age and race distribution of the population which has led to such false views in regard to the health of tropical cities, especially Havana, Cuba. If the mortality of Havana is analyzed by age periods and with due regard to color, it can be shown that, while the death rate of white males ages 40–49 is 16.2 per thousand in Washington, D.C., it is 31.8 per thousand in Havana, Cuba,—a very radical and material difference, wholly out of proportion to and not at all indicated by the crude death rate, which represents the local mortality as fairly satisfactory. The crude death rate very rarely, if ever, can be relied upon in making comparisons of the mortality of different communities, although it is a fairly satisfactory index factor of local conditions where the mortality of a given city is compared with itself for a period of years.

The Omission of Original Data of Population and Deaths by Age and Cause.

In no other part of the census volumes on vital statistics is the absence of the original data, and is the need thereof, more clearly illustrated than in the use of this table of death-rates at certain ages in registration States and cities. While it is true that the original figures as to deaths by cities and at age periods have been given in Table 5 of Part II, of vital statistics, no corresponding details regarding the population of the same cities are available excepting in so far as they relate to cities with more than twenty-five thousand inhabitants. Thus an effort made by the writer to construct tables showing the mortality, by ages, of cities on the lakes, in the interior, in the Southern States, and on the Pacific Coast, was futile, since for a large majority of the communities dealt with no corresponding information was available regarding the age distribution of the population. Nor would even this have been entirely satisfactory, since for an accurate statement of the facts the fundamental tables should give the population and mortality by age, with distinction of color and foreign born in all cases where either one or the other element forms more than 20 per cent. of the total population. This, of course, is an arbitrary percentage, and merely an approximate indication as to where the line could have been drawn. Since the population data of the different registration cities were used in computing the rates given on pages lxxx, etc., it seems little short of a statistical crime that the original data were not given to the public.

Mortality by General Nativity.

The death rates by certain ages or classes given on page lxxxii could have been consolidated by omitting the group called "Native," which, as is well known, contains such opposite factors as native whites of native parentage and native whites with one or both parents foreign. It would seem more

useful to merely give, after the rates of the white population, the rate for the native whites of native parents and the native whites of mixed parents, and, in addition of course, the mortality of those of foreign parents. This would allow for the addition of other elements; as, for instance, the Chinese or Japanese, if sufficiently numerically represented in certain cities, like San Francisco, Cal., or Portland, Ore.

The Average Age at Death.

The average age at death is discussed in Section VII at greater length than it would seem proper to give to a practically discarded subject in vital statistics. The publication of this information in the form of a census bulletin led to a very large amount of misleading information in the public prints, so much so that, in a measure, it would seem more advisable to omit this series of data altogether. There certainly is not always a definite relation between an increase in the expectation of life and an increase in the average age at death, which may result from entirely different causes. The average age at death is of most value when given for specified diseases, as has been done on page lxxxvi, since it makes possible a readily intelligible estimate of the probable loss of life resulting from an undue mortality from certain diseases, or, as the case may be, from casualties or suicides. To illustrate a method in which the average age at death can be employed in dealing with certain social problems, we may take the average age at death of suicides. This is given as 43.6 years for the year 1900. The normal expectation of life at age forty-four is about twenty-four years; and, since there are approximately 10,000 suicides per annum in the United States, the net economic annual loss to the country as the result of suicide is 240,000 years of life. To this extent a statement of the average ages at death is quite useful; and it is, furthermore, a ready index factor of the probable age of greatest frequency at which deaths from different diseases or causes occur. Thus, for example, the average age at death of those

who die from measles is given as 4.4 years, while the average age at death from consumption is given as 35.3 years, and that from cancer as 58.1 years; but, as stated, this factor is of very limited utility, and one most likely to be abused and employed improperly by newspaper writers and the general public.

Omitted Life Tables.

It would have been interesting if Mr. King had given some explanation why no life tables were calculated on the basis of the results of the Twelfth Census, as was done under the direction of Dr. Billings in connection with the vital statistics of the Tenth and Eleventh Censuses. While it is true that such tables were deduced from data not entirely satisfactory, they proved, in many respects, a valuable addition to the literature of the subject, and of relatively considerable importance in connection with numerous investigations. For certain States, like Massachusetts and New Jersey, the data would seem sufficiently complete to have warranted the introduction of a limited number of tables, at least for States and cities in the north-eastern part of the United States.

Mortality by Conjugal Condition.

The mortality by conjugal condition, as discussed in Section IX of Part I, forms a useful contribution to our knowledge of an exceedingly interesting and important subject. Since the relation of marriage to mortality was first discussed on the basis of statistical data by Farr before the Social Science Congress of 1857, numerous investigations have been made; but few have proven of value, since little attention was paid to the causes of death among the married, the unmarried, and the widowed.*

* The practical value of statistics of mortality by conjugal condition is set forth in a series of papers by the writer on "Marriage and Mortality" in the *Spectator*, a New York insurance journal, for November, 1902. A very useful summary of several investigations into the same subject will be found on page 29 of the report of Körösy on the Mortality of Budapest for the period 1886–90. The best illustration of the method to be followed in inquiries of this kind is T. A. Coghlan's "Childbirth in New South Wales," containing tables showing the expectation of married life, the mortality, etc.

Mr. King gives five tables in his analysis, of which, however, only two are of determining value. In the first of the tables the error in the Eleventh Census is repeated by publishing crude death rates for the single, the married, and the widowed, without excluding the population at ages under fifteen, which, of course, forms a very large proportion of the "Single," as thus referred to in the table. It seems hardly necessary to draw attention to the fact that, in discussing the mortality by conjugal condition, the divisional line must be drawn at the age below which marriage is a practical impossibility or of exceedingly rare occurrence. To discuss the effects of marriage by comparing a population containing a vast number of infants and children with one exclusively limited to the conjugal state is as inaccurate as if we were to compare the liability of officers in the field to death in action with that of students at the West Point Academy. Thus the first table of the five is grossly misleading, showing, for example, the mortality of single males of all ages to be 16.6 per thousand against 16.4 per thousand for the married,—a difference of 0.2 per thousand in favor of the latter, making the mortality of the two classes practically identical. The conclusion based on the crude data would therefore be that the conjugal state did not have a perceptible effect upon mortality, when, as a matter of fact, the very opposite is the truth. Even by excluding persons of ages under fifteen, the real truth of the matter is not stated, since the mortality of single males of fifteen years and over is thus given as 11.6 per thousand, and of married males as 16.7 per thousand,—a difference of 5.1 per thousand in favor of the single, leading to the conclusion that the single enjoy a much lower mortality than the married at ages fifteen and over. The approximate truth is only ascertained when we consider specific age groups, as, for example, fifteen to forty-four, at which the mortality of single males is 9.4 per thousand, and of the married 8.1, showing a difference in favor of the married of 1.3 per thousand, leading to the accurate conclusion that mar-

ried males during early married life are subject to a slightly lower mortality than the single. The difference becomes more pronounced at ages forty-five to sixty-four, at which single males have a mortality of 33.3 per thousand against a death-rate of the married of 20.4 per thousand, showing a difference in favor of the married of 12.9 per thousand. At ages sixty-five and over the single males experienced a mortality of 107.8 per thousand against that of the married of only 75.0 per thousand, the difference in favor of married males being 32.8 per thousand. Since general statements in the public press, and even in medical discussions, usually ignore the mortality by divisional periods of life, the first table given in the census returns is the one most likely to be quoted, and the one which gives rates and conclusions diametrically opposite to the truth. The fallacy is repeated for the five subdivisions of the registration area, and thus a considerable amount of valuable space and time has been wasted upon entirely misleading and useless data. Instead of the rates by subdivisions of the registration area, the report should have given rates by shorter divisional periods of life, if possible by ten-year periods and only for the registration area as a whole. It certainly can serve no useful purpose to learn whether the mortality of the married, single, and widowed, is higher or lower in the group of registration cities than in a group of cities in non-registration States; but it would have served a large and most important interest, had the fundamental data of population and deaths been given for the registration area by conjugal condition and by ten-year divisional periods of life as high as eighty-five years of age.

The third table of this series carries forward the same fundamental fallacy involved in the first in that crude death-rates are given to show the mortality from certain diseases by color, sex, and conjugal condition without distinction of age. Attention to the elements of the population, but especially to the diagram given on Plate 9 of Population, Part II, would have made clear to the Census Office the fallacy of giving

the mortality of the single and married without distinction of age, from diseases such as cancer and tumor, for example, which affect almost exclusively adult periods of life. Thus I cannot better illustrate the fallacy involved in this table and the erroneous conclusions to which the same must lead than by the statement that according to the third table, given on page xciii, the mortality of single females from cancer and tumor is 18.2 and that of the married 116.4 per hundred thousand with the implied conclusion that married women, as a class, are subject to an enormously higher mortality from cancer and tumor than the single. But, as a matter of fact, the mortality from cancer depends largely upon age; and the fourth table of the series shows conclusively that at ages forty-five and over single females are subject to a higher mortality from cancer and tumor than married women.

Disease Classifications.

While discussing this third table, it may also be pointed out that suicides are given fourth place in the number of diseases or causes of deaths discussed in detail, followed by "General Diseases — A," whereas the general practice in other parts of the reports has been to precede all diseases by the group called "General Diseases — A," and place suicides after accidents and injuries where, in the standard nomenclature of diseases or causes of death, they properly belong. This arbitrary shifting of diseases from one position to another prevails throughout the analysis of the vital statistics in Part I, but it is only proper to add that the error is the result of a repetition of Dr. Billings's methods in the Census of 1890.

Valuable Rates of Mortality by Conjugal Condition.

The fourth table of the series, showing death rates from selected causes by age and sex, is an exceedingly useful one; but, unfortunately, the rates being limited to large divisional

periods of life, they are not as useful as they could readily have been made, and without sacrifice of space, if other useless and misleading data had been omitted. While this table is of value, it gives evidence of hasty compilation and ill-considered treatment in that the important group of diseases of the respiratory organs is entirely omitted,* and, incredible as it seems, in a discussion of the mortality by conjugal condition no information is given regarding the mortality of married and single women from puerperal affections. While this group of diseases is referred to in detail in the section on mortality in its relation to season, it is entirely omitted from the section where, if anywhere, it properly belongs. While fully recognizing the inherent difficulty of obtaining absolutely accurate information regarding puerperal mortality among unmarried women, still an attempt in this direction would have been more useful than the entire omission in this section of the mortality of women from the results of pregnancy. Nor has this information been given in the fundamental tables following the Introduction; and thus the, perhaps, most important aspect of an interesting problem of human mortality is entirely ignored. In the fourth table, suicides are placed in their proper position; that is, at the end of the table; but neither alcoholism nor accidents and injuries are included in this table, which, as previously stated, is one of the two tables of really determining importance given in this section.

The fifth table of this series has the heading, "Proportions of deaths from certain causes per 1,000 deaths from known causes." Even the most superficial student of vital statistics has a reasonably definite idea as to what is meant by this heading, and he concludes naturally that what this table is intended to show is the proportion of deaths from specified causes of the mortality from all causes by conjugal condition. This, however, is not by any means what the table really shows. It required a re-examination of the fundamental data to make it clear to the writer just what was

*The same omission occurs in the report on the Vital Statistics of the Eleventh Census, Part I, p. 59.

implied in this tabular summary; and, whatever criticism regarding omission or commission may be applicable to other parts of the census volumes on vital statistics, the most serious objection applies to this table, which is completely misleading and unworthy of being introduced into a work making pretensions to scientific accuracy and usefulness.

What the Census Office really shows in this table, but what is not at all implied in the heading, is the proportion of deaths by conjugal condition of persons dying from different diseases or groups of diseases at different periods of life: thus, for example, of every one thousand single males dying from consumption in the registration area, 883.6 died at ages fifteen to forty-four, 99.7 at ages forty-five to sixty-four, and 16.7 at ages sixty-five and over. What useful purpose such a table can serve the writer fails to understand, but that it leads to absolutely wrong conclusions is readily apparent when the mortality of the widowed is compared with that of the single; for then this table would lead to the assumption that any given disease, no matter which may be selected, is proportionately much more fatal or much more common among the latter than among the former. I cannot do better than cite a single illustration of the misleading conclusions imposed upon the public: —

MORTALITY OF SINGLE MALES FROM SUICIDE.

Ages	15-44	45-64	65+
Rate per 1,000 of population	15.2	56.0	77.3
Ratio per 1,000 deaths at each age	792.9	170.3	36.8

Thus, according to the fourth table, represented by the rate given, the mortality from suicide among single males increases with advancing age; but, according to the fifth table, represented by the second line, showing for the total mortality the proportion of deaths at different periods of life, the mortality from this disease constantly decreases with advancing age.

Season and Mortality.

The mortality, by months or seasons, in relation to deaths, is briefly discussed and illustrated by four diagrams. No explanation is given as to the method adopted of arriving at the monthly death rate, the assumption being that the rates have been calculated from the population as determined for the census year, with no correction for the monthly decrease in population backwards to June, 1899. Nor is it stated whether the actual number of deaths stated for different months were adjusted to eliminate inaccuracies due to the unequal length of the months, the importance of which has been so clearly pointed out by Dr. Abbott in "Vital Statistics for Massachusetts for 1856–95." As Dr. Abbott remarks, "It is quite plain that an estimate of population which can be applied in calculating the death rate in January and February cannot reasonably be applied to the same purpose in November and December, since the annual increase in the population is thus disregarded."

Erroneous Monthly Death Rates.

The need of corrected and adjusted data in any statement of the mortality by months becomes at once apparent when it is pointed out that the death rate reported by the census for February is 143.6 per hundred thousand against a rate for January of 146.8, when, as a matter of fact, the mortality during February is higher than the mortality during January, when proper correction is made for the differences in the length of months. This point being one of quite considerable importance, I have calculated the population for the different months of the census year; and the results are shown in the following table, in which the monthly mortality has been corrected and adjusted on the basis of 30 5-12 days per month. The table shows, in addition to the corrected rates per hundred thousand of population, the unadjusted rates as calculated by the Census.

CORRECTED MONTHLY MORTALITY RATES FOR REGISTRATION STATES: ALL AGES, MALES AND FEMALES.

	Corrected Estimated Population.	*Corrected Deaths.*	*Corrected Rates per 100,000.*	*Census Rates (Unadjusted).*
June, 1899.	17,140,188	21,811	127.3	123.2
July "	17,167,612	25,826	149.8	150.8
Aug. "	17,195,080	24,944	145.1	145.7
Sept. "	17,222,593	23,240	134.9	132.0
Oct. "	17,250,149	21,385	124.0	125.0
Nov. "	17,277,749	21,415	123.9	121.1
Dec. "	17,305,393	23,027	133.1	134.5
Jan., 1900.	17,333,082	25,127	145.0	146.8
Feb. "	17,360,815	27,226	156.8	143.6
March "	17,388,592	31,485	181.1	183.9
April "	17,416,414	30,876	177.3	174.5
May "	17,444,280	25,340	145.3	148.0

This table shows conclusively the fallacy of publishing monthly death rates without making the necessary correction for an increase in the population and for the inaccuracy resulting from the unequal length of different months, but especially of February. In calculations of this kind, however, where different methods are likely to be employed in arriving at a given result, it is of the utmost importance that the method made use of should be definitely stated, and, if possible, illustrated by examples.

Misleading Graphic Illustrations.

The method employed of exhibiting graphically the mortality rate by months is the one which has been used for many years, but, from the writer's point of view, not to the best advantage. The area representation around the centre of a circle gives a curiously shaped figure, the importance of which is practically beyond the grasp of the average reader. While the technique of graphic illustrations cannot be discussed here, it may not be out of place to point out that, if the rates had been laid off on the twelve equal segments of the circle by means of heavy black lines, a much more

definite view of the variations in the death rate by months would have been given.* A further and very serious defect of these illustrations is that the scale to which they have been drawn is not uniform, while the size of the circle is always the same, leading of course to wrong conclusions, unless all the facts are taken into account.

Locality in Relation to Mortality.

Locality in relation to deaths is discussed at some length, but the remarks are confined to the twenty-one grand groups into which the United States have been divided for the census investigation of mortality. This aspect of the general problem of human mortality in a vast country like the United States is one of very considerable importance; and it would be next to impossible to do entire justice to the matter, even though a whole volume were devoted to the subject. The treatment is, on the whole, satisfactory, considering the inadequacy of the data for non-registration sections; but an exceedingly valuable addition could readily have been made if the registration cities in different sections of the United States had been combined in such a manner as to show, for example, the mortality rate of lake cities, of Southern cities with distinction of color, of Western cities with distinction of altitude, of Eastern cities with distinction of foreign parentage, etc. It would, however, have been readily possible for any one to construct such a table, for a number of purposes of great value, had the Census Office given the original data as to population and deaths by age, race, and parent nativity for the cities of the registration area. This, as previously pointed out, was unfortunately omitted; and for a larger sphere of public utility the volumes are inadequate.

*For a graphic illustration of this method see Mayr's "Die Gesetzmässigkeit im Gesellschaftsleben," Munich, 1877, p. 78. See also the annual report of the Surgeon-General of the United States Navy for 1884, diagram facing page 261. An early appreciation of this point as applied to census vital statistics will be found in Kennedy's preliminary Report on the Eighth Census (1860), p. 27, where he points out that "a correction has been made for unequal months by first adding one-thirtieth part to the deaths in April, June, September, and November, and two twenty-ninths to the deaths in February, thus changing all to the majority standard of 31 days before casting the proportions."

The rearrangement of the cities by altitude, longitude, latitude, average rainfall, average temperature, and average humidity, would also have been readily possible if the fundamental tables of population and deaths had been given to the public. By just so much as this fundamental principle of census inquiry and publication is disregarded, by just so much the published volumes fall short of the highest possible degree of public utility. I may illustrate the importance of this point by calling attention to Map No. 8, showing the relative proportion of deaths from malarial fever in different State groups. Almost the entire area south of latitude 35 degrees north and west of longitude 100 degrees west forms one immense malarial belt, where human mortality is at its lowest value and where both whites and colored die out of all proportion from one specific and well-recognized cause, when compared with the more healthful sections of the country. No problem of human life is more constantly misunderstood than the actual mortality of the white population in Southern cities; and the most misleading statements are often given to the public.

Thus of recent health publications for Southern cities there is one in the Shreveport, La., *Times* of June 8, 1902, referring to the city as "one of the healthiest in the entire South," further supplementing this statement by the remark that "to the citizens of Shreveport and those familiar with the city this is an axiom, a self-evident truth." The city finds fault with the publication of the Census Office to the effect that Shreveport had a death rate in the census year of 45.5 per thousand, this being attributed to an over-stated mortality and to an under-stated population. A special municipal census was ordered, showing a population of 24,324 against a census population of 16,013. Regarding the accuracy of this enumeration, the *Times* published "the affidavit of the mayor." The enumeration was made by a company compiling a local directory; and, by various means usual to such enterprises, the official death rate was reduced to 15.7 per thousand for resi-

dents and 21.9 for non-residents. A comparison is then made with other Southern cities, showing, of course, that Shreveport "is the most healthful in a Southern latitude."

Mortality of Northern and Southern Cities.

There can, however, be very little doubt but that the census returns for Shreveport were at least approximately correct; and the data as set forth in the following table show the mortality per thousand living at different periods of age for Washington, D.C., New Orleans, La., and Shreveport, La.: —

ILLUSTRATION: DEATH RATES OF SOUTHERN CITIES PER 1,000 OF POPULATION.

	0-5	5-14	15-24	25-34	35-44	45-64	65 +
Washington, D.C. .	81.0	7.0	9.7	11.2	13.0	27.3	103.3
New Orleans, La. .	71.2	6.1	14.2	20.1	25.1	42.6	119.4
Shreveport, La. . .	112.4	13.1	33.2	36.0	45.7	58.9	175.5

It will be observed that the mortality of Shreveport per thousand living at each period of life is very much in excess of the normal mortality of Washington, D.C., and of New Orleans, La. Of course, the aggregate death rate for both races combined is materially affected by the proportion of negro population. Thus while Washington, D.C., has a colored population of 31.3 per cent., and New Orleans of 27.2 per cent., the proportion for Shreveport, La., was 53.4. The excessive death rate, therefore, is very largely the result of the excessive proportion of colored population, not taken into account in the census table of death rates for cities, published on pages lxxx–lxxxii. While a more detailed analysis would have shown the white mortality of Shreveport to be certainly as high as the white mortality of New Orleans, it is unjust and unfair toward any community to publish death rates of this kind, even if given by age periods. All this does not affect the real fact that a great many Southern cities, Shreveport probably included, are subject to a much higher mortality among the white population than cities lo-

cated in more temperate latitudes. The case quoted will illustrate the absolute necessity of calculating death rates per thousand at different age periods with distinction of race in Southern cities and with distinction of foreign parentage for the principal cities of the North.

Causes of Death.

The causes of death are discussed at considerable length in Section XII, which takes up the larger part of the analysis. The Census Office has followed the method adopted for the Eleventh Census, and has incorporated in its discussion most of the faults which so materially impaired the value of the earlier contributions to census vital statistics. The proper criticism of this section would take up a very large amount of space in view of the fact that nearly every important problem of vital statistics is involved in the methods and results here set forth.

The census makes use of the antiquated nomenclature employed by Dr. Billings instead of the Bertillon system now made use of by most of the registrars of vital statistics of American States and cities and foreign countries. This is a most unfortunate error at the outset of the discussion, since it leads to a great deal of confusion and the omission of important vital facts, which would have been impossible, had the Bertillon system been adopted. In one of the fundamental tables (Vital Statistics, Part II, Table 7) the census office gives 219 causes of death in alphabetical order, and this table in a measure acts as a check upon the tables employed in the analysis; but here, again, we meet with the omission of details regarding ages at death which, for a large variety of purposes, would have been exceedingly useful to those interested in the mortality from diseases other than those represented by the more important causes of death. Of course, any alphabetical arrangement of diseases must fall short in that specified causes of death forming a group must needs be distributed

over different sections of the alphabetical table, as, for example, in the case of deaths from puerperal affections, where we find five minor subdivisions, which, of course, must first be added before an intelligent opinion can be arrived at regarding the total mortality of this well-defined group of diseases of women. However, the difficulty of combining the different minor causes of a larger group of causes by age periods would have been comparatively slight, while the entire omission of so important a correlated element as the ages at death by minor specified causes must prove a serious disadvantage. The tables as given by regional divisions of the country cannot possibly be as useful as tables showing for each of the two hundred and nineteen causes of death the age distribution by five or at most by ten-year periods. Table 8, of course, gives this necessary information for the more important causes and groups of causes, but to cite an illustration: if for medical purposes it be desirable to ascertain the ages at death of the 804 persons who died from biliary calculus, the information is not to be found in Vital Statistics, Part II, Table 8, page 232, where one would naturally expect to find the details pertaining to this disease, the more so since elsewhere the details as to ages are given for urinary calculus, causing an aggregate mortality of only 431 deaths in the United States against the 804 caused by biliary calculus. The latter disease is, therefore, as a cause of death, about twice as important as the former, for which all the necessary details are given by age and sex.

An elaborate table of deaths from each principal disease and class of diseases is given on page cxiii of the analysis, and in a general way the arrangement adopted by Dr. Billings has been followed, leading to a no small amount of confusion and the omission of quite a number of important causes of death. This table could have been materially improved if the details for subdivisions of the registration area had been omitted, and if, in place thereof, the actual data regarding the population and deaths had been given in addition to the corresponding

rates for the registration area as a whole, for the registration cities, and for the rural part of the registration area.

Among the more important omissions from this table mention may be made of hydrophobia, causing 123 deaths,—a small number, it is true, but of comparatively considerable importance, and an item likely to be looked up as a matter of reference by many who are otherwise but slightly familiar with vital statistics. The disease was incorporated in the corresponding table of the Eleventh Census (Vital Statistics, Part I, p. 224), and it could readily have been incorporated here. Smallpox, causing 3,484 deaths in the United States during the census year, is also omitted from this table.

Arbitrary Deviations from Adopted Standards.

The actual number of deaths occurring in the registration area is not given in this table; and, therefore, constant reference to fundamental Table 8 is necessary in order to bring out the real importance of the facts dealt with and the probable accuracy of the conclusions arrived at. Of other omissions of no small importance, mention may be made of locomotor ataxia, which should properly have been referred to in the group of nervous diseases. More details should also have been given in the group of circulatory diseases, where only three specified diseases are dealt with instead of the usual six or seven. Poison is included in "General Diseases — B"; but no distinction is made as to deaths resulting from chronic industrial poisoning, such as lead, arsenic, etc. The deaths from poisoning, the result of accidental causes, should have been separately stated and included in the group of accidents and injuries. Information is given (p. 228, Part II) as regards deaths from lead poisoning (113 deaths); but there must certainly have been deaths resulting from other forms of industrial poisoning, such as arsenic, copper, zinc, etc. The error of including deaths from "other" poisoning under "General Diseases — B" is illustrated by the fact that there were 3,390 deaths from

this group of causes, many of which, of course, should have been included under general accidents and injuries. The seriousness of the omission of the mortality from affections connected with pregnancy from the tables by conjugal condition is illustrated very forcibly by the rate of 26.2 per hundred thousand for the registration area against a mortality of 12.6 for diseases of the female organs of generation; and thus a group of diseases causing but one-half the number of deaths in the registration area is dealt with in considerable detail, while a cause of twice the importance is entirely omitted from the analysis and from the fundamental tables of mortality by conjugal condition. Since at least 9,699 deaths were due to these causes in the United States, the importance thereof cannot be exaggerated. The mortality from accidents and injuries could readily have been given in more detail; and some detailed reference should have been made to the mortality from mining accidents, for which 1,303 deaths were returned in the United States.

Changes in Disease Classification.

Most serious objections apply to the frequent and unaccountable rearrangement of the causes of death in the different tables employed in the analysis. It would require too much space to deal with all the numerous variations and vagaries in disease nomenclature, some of which have been already pointed out, as, for instance, in the tables relating to conjugal condition, where in one table suicide is given the fourth place, while in the table following it is given at the end. It would seem to the writer that, as a matter of convenience, the tables could have been much more readily arranged in accordance with a uniform method of disease nomenclature; but it is only proper to add that Mr. King simply adopted the tables of Dr. Billings in the reports of the Eleventh Census where identically the same errors of omission and commission occur. Thus, for example, in the Eleventh Census no reference is made to deaths in pregnancy in the

mortality by conjugal condition, and the information is likewise omitted from the Twelfth Census. The same applies to the diseases of the respiratory organs and also to the curious position given to the mortality from suicide, all of which illustrations are merely to the point that there was a blind following of precedent, which is deplorable in a work of this kind, which must needs be before the public as a standard work of reference for many years before the information of the subsequent census will become available.

A considerable number of diseases are discussed in detail, partly by tables, partly by diagrams, and partly by textual discussion. The work of the specialist would have been made much easier if the heading of the pages had been made to indicate the specific diseases dealt with on the page, or at least if proper catch-titles had been adopted instead of the use of ordinary type. Thus reference to any specific disease makes it necessary for one not thoroughly familiar with the order in which the diseases follow one another to go over a large number of pages and pick out the specific cause of death about which information may be required. It would not have been at all difficult to have made some reference to the disease dealt with at the heading of the page; and thus the specialist would have been saved a very large amount of labor, while the utility of the volumes would have been materially enhanced. This criticism applies with even greater force to the headings of the tables themselves, where there is a complete absence of any indication as to the diseases dealt with. Thus, for example, the mortality from measles as given by months is headed "Deaths by Months"; but it is invariably necessary to refer backwards to the text to find what disease is covered by the table, and, instead of disposing of the matter by a single line, from three to five lines of text are consumed in making an unnecessary explanation. But the main objection is the waste of time imposed upon the one making use of the reports and the increased liability to error in the use of the tables. A blunder of this character

imposes very considerable burdens upon those who make use of the reports.

Diagrams showing the mortality by months in cities and rural sections of the registration area are continued throughout the volume in the discussion of almost every disease, while, as already pointed out, in many instances the rates and ratios by months are entirely misleading,—in that for February the data are not adjusted for the shorter number of days; but they are also otherwise misleading, and for general purposes entirely needless. They take up a very large amount of space which could have been used to better advantage; and it may not be out of place to add that, generally speaking, they are not a credit to the engraver's art. To whatever purpose, however, they may be applicable, the reader will find it an exceedingly arduous task to trace in each case the disease specifically dealt with, for the only headings to the diagrams are the meaningless words "Cities" and "Rural."* But, as stated, the rates themselves are inaccurate and misleading, certainly for all diseases for the month of February.

Useful Maps of Disease Prevalence.

The maps which accompany the textual discussion of most of the diseases are very interesting; and, being of uniform color, they are not the eyesore which disfigured so many of the illustrations of the similar reports of the Eleventh Census. The writer, however, questions the expediency of using State groups to indicate the regional differences in the mortality instead of using the grand groups as illustrated in the map which forms the frontispiece of Part I. Here, again, we may express our regret that the registration returns of cities were not combined in such a manner as to give information for sections of the country, as, for example, in the discussion of the mortality from typhoid fever, when it would have been

* This is also a repetition of the method of the Eleventh Census. See Vital Statistics, Part I, p. 244.

of value to have the average rates for the cities drawing their water supply from the lakes in contrast to the cities of the interior regions of the West or of the extreme South. It would also have been of considerable value if, instead of the meaningless subdivisions of the registration area, given in elaborate detail, with distinction of sex, rates had been calculated for at least the more important cities, with due regard to age, color, and parent nativity. On these most important points the analysis by causes of death is silent.

Regional Mortality Data.

The mortality of the grand groups is shown in tabular form on the basis of ratios of deaths from specified causes to one thousand deaths from known causes; and, in the absence of more accurate information, the table is a useful one for reference. However, for some curious reason (following Dr. Billings's report for 1890), the subdivision for rural sections precedes, in this table, the subdivision for cities, while in all the other tables throughout the volumes on vital statistics the rates and ratios for cities invariably precede the corresponding information for the rural sections of the registration area. This point is, apparently, one of small importance; but, when it is taken into account how small an amount of time the physician, sanitarian, or any other person, interested in a particular problem of human mortality, can give to the examination of such data, it is of the utmost importance that everything should be done to avoid confusion of ideas and misleading conclusions likely to result from unnecessary changes in the position of the facts given in the analysis. It is the very object of an analysis to attain this purpose, but it was certainly not accomplished in this particular case.

Mortality from Specified Causes by Divisional Periods of Life.

The mortality from specified causes by ages is shown in the form of a table which has for its basis the total number of deaths from the same cause at all ages, showing, for example, the proportion of deaths, at any given age, from consumption to the mortality from consumption at all ages. While such a table is of value, the true measure of the occurrence of this disease and its true age incidence would have been better shown if rates had been given per thousand living at each age period, or at least per thousand deaths from all causes at each period of life on the basis of Table 25. In other words, the fundamental table from which the summary tables are deduced is 24 in Part I, showing the ratio of deaths at each age per thousand deaths at known ages from each cause, whereas the more accurate and useful method would have been, if rates could not have been calculated per thousand living at different periods of life, to have used Table 25, showing the deaths from each cause per thousand deaths from known causes at *each age*.

Another serious fault to be found with this tabular presentation of the facts pertaining to specific causes by ages is that no space intervenes between the data for single years under five and the groups of years above this age. The tables are illustrated by means of diagrams, which are, however, for males and females combined, for which no corresponding rates are given in the analysis, making necessary their rearrangement and recalculation on the part of those who wish to test the accuracy of the graphic illustrations. Here, again, we meet with evidence of the unfortunate adoption of Dr. Billings's methods in that the diagrams give information from age ninety-five downward, while the tables give the corresponding information from age one downward. A hasty consultation of the work would therefore lead to the conclusion that the proportion of deaths from consumption at differ-

ent periods of life follows an entirely different law than is established by the ratio tables incorporated in the textual discussion.

The Proper Object of Graphic Illustrations.

Graphic illustrations can serve only one purpose, and that is to make it unnecessary on the part of the reader to undertake the laborious task of re-examining original data or the corresponding rates and ratios. A graphic illustration is intended to impress instantly upon the observer a definite fact determined with reasonable accuracy and representing the result of final analysis on the part of a qualified expert. It can serve no other purpose, and therefore by just as much as an illustration falls short of this conception it is reduced to a mere item of filling space or worse, to a means of leading the reader astray in his conclusions. This criticism applies to most of the illustrations given in the census volumes, but especially to the graphics attempting to show the mortality by months from specified causes, and the distribution of deaths from specified causes by divisional periods of life. This criticism also applies in no small measure to the maps, which should have given the mortality for regional divisions on the basis of grand groups instead of giving the data by State groups.

The Mortality from Cancer.

There is not the space to discuss in detail the mortality from various diseases and the possibilities of more useful methods with due regard to local conditions and the specific nature of the more prominent causes of death. In only one instance has the general rule of stereotyped textual discussion been departed from; and that is in cancer, a subject which also received detailed treatment in the vital statistics of the Eleventh Census. The probable actual and relative increase in the mortality from this disease makes it a matter of great importance to physicians and others that the facts

ascertained should be fully set forth on the basis of a large number of observations representative of general conditions. This has been done to a considerable extent, and the mortality is shown to special advantage by means of maps and rates on the basis of the population for the registration States.

The first and most serious objection to the cancer mortality table, giving evidence of ignorance of, or indifference to, the real nature of the problem, is found in a table of rates showing the proportion of deaths from cancer of certain organs at all ages. This treatment must needs lead to false conclusions, although the error is, in a measure, minimized by supplementary information giving the data by divisional periods of life. The table of cancer, by organs affected, should have been given by conjugal condition, since, taking only one illustration, the mortality from cancer of the breast is unquestionably materially affected by the conjugal state of women dying from this disease, which, I may add, is undoubtedly on the increase in the United States.* The only American registration reports giving information on this point are those of the Health Officer of the District of Columbia; but, unfortunately, the ages at death are not given. It is but quite recently that the results of an elaborate investigation into this subject have been published in Germany and Holland,† and the census volumes could have contributed much more useful information than has actually been the case. The special treatment by organs affected is carried through several tables, in all of which, unfortunately, a column is given showing the mortality at all ages. Let us show how entirely misleading a statement of the mortality from cancer without regard to age can be, in quoting from the table of cancer of the uterus. Here it is stated that the death rate of foreign white women is 24.5 per hundred thousand, while the rate for colored women is given as 20 per hundred thousand, leading to the conclusion

* For a discussion of the statistics of cancer of the breast see a paper by Dr. Frederick S. Dennis, Journal American Medical Association, Oct. 19, 1901.

† "Bericht über die vom Komitee für Krebsforschung erhobene Sammelforschung," Jena, Gustav Fischer, 1902.

that the foreign white women are more liable to this affliction than those of negro parentage. As a matter of fact, the very opposite conclusion is the truth; and, if examined by divisional periods of life, it is shown that, without exception, colored women have experienced a higher mortality rate from cancer of the uterus than white women of foreign parentage.

Misleading Cancer Death Rates.

It must always be kept in mind that tables of this kind are consulted by a large number of busy practitioners and others who cannot be expected to re-examine into the original facts nor to assume, the practically incredible, that misleading rates of this character should be published and printed by government sanction under government authority. Returning once more to Mr. King's statement in the Introduction, that, to prevent improper use of the data, especially of abnormal rates, he would omit data insufficient for the computation of reliable rates. There is no excuse for publishing crude death rates, which can only lead to the confusion of the less-informed general public and to an increasing distrust of rates and ratios which yet, after all, are the only method and the only means by which the importance and true meaning of a vast amount of closely inter-related facts can be made intelligible.

Important Omission of Occupation Mortality Data.

A useful addition to the tables showing the various causes of death could readily have been made if, for important causes, a table had been added showing the disease prevalence in different occupations on the basis of rates per thousand living at specified periods of life, just as this has been done for persons of foreign parentage. Thus, to illustrate this point a little more fully, it is shown, for instance, on the basis of the mortality returns pertaining to respiratory diseases, that persons of Italian parentage have experienced a death rate of 7.1 per

thousand from this group of causes against a mortality of only 2.1 per thousand for persons of native parentage. And in the same manner the industries and employments in which respiratory diseases, in part, perhaps, as the result of exposure to extremes of heat and cold, are most common, could have been pointed out. On reference to a subsequent section of the report it is shown, for instance, that pneumonia causes a mortality of 2.6 per thousand among clergymen, while causing a death rate of only 1.2 per thousand among bankers and brokers. For some curious reason, in the discussion of respiratory diseases a table is incorporated, showing the mortality by conjugal condition, which should have been given in the discussion of conjugal mortality in another portion of the report.

Deaths from Diseases Peculiar to Women.

Diseases of the female organs of generation are discussed as a class, when a brief statement of the more important diseases forming this group would have been a useful addition to the tables. Affections connected with pregnancy are discussed in some detail, but, as previously pointed out, for some inexplicable reason, without reference to conjugal condition. Such details could also have been given to advantage as to the different puerperal diseases, especially as to abortion, post-partum hemorrhage, extra-uterine pregnancy, etc. The rates per thousand are calculated for the entire child-bearing period, that is, fifteen to forty-nine. This is a most unfortunate limitation, since there are unquestionably very important differences in the mortality from puerperal affections at different periods of life. The rates should have been given by ten-year periods from fifteen to forty-five, and by a twenty-year period from forty-five to sixty-four. Such rates would have been readily comparable with other rates for the purpose of affording a measure of the real importance of the mortality from this group of causes. As given (that is, fifteen to forty-nine), the rates are comparable with none in other parts

of the census analysis. But the most serious omission is the absence of any information regarding the deaths in pregnancy by conjugal condition.

The Mortality from Accidents and Injuries.

Accidents and injuries are considered as a group; and no detailed analysis is made of the different causes, which, of course, are a matter of very considerable economic and social importance. In the many discussions of Employers' Liability Acts and Government Insurance Protection of workingmen in dangerous trades and industries, a detailed analysis of this kind would have proven a very useful addition to a very limited body of facts.* The discussion of accidents and injuries as a group serves absolutely no practical purpose, since the deductions cannot be applied to the solution of any given problem, being derived from radically different fundamental conditions, and giving rates and ratios of no definite value. As previously stated, deaths from poison have not been included here, having been incorporated in the group termed "General Diseases — B." But it may be added that in the detailed discussion no reference whatever is made to this group of diseases and accidents which, from a medico-legal point of view, is certainly deserving of considerable attention, and also from the standpoint of industrial hygiene in any inquiry relating to the occurrence of chronic industrial poisoning. The absence of a definite distinction between deaths from chronic poisoning and accidents of this nature is a further indication of the non-critical nature of the final analysis. It is hardly necessary to say that deaths from accidental poisoning should have been included in the group of accidents and injuries. A still more curious and important omission in the analysis is the mortality from homicide; and, while a most elaborate discussion follows regarding deaths from suicide, no reference whatever is made to deaths from

* See "Report of the Committee on Insurance and Loans," David J. Lewis, chairman; also, "Senate Bill No. 183, Session of the Maryland Legislature, 1902."

homicide in the section on accidents and injuries, nor is there a textual reference or explanation made of the reasons which prompted the omission of such an important cause of death.

Occupations and Mortality.

For immediately practical purposes Section XIII is, without question, the most useful portion of the report. This subject was first introduced into the reports of the Eleventh Census, previous discussions and references to the mortality by occupations having been of no practical importance. The limitation of the data to the registration area, and the calculation of accurate rates per thousand living at different periods of life, makes the basis and the conclusions at least approximately reliable. In the aggregate, information as to the mortality by occupations is given for 5,575,745 males and 1,587,874 females; but detailed information is given for eight groups of occupations subdivided into sixty specified groups for males, while for females detailed information is given in regard to fourteen employments, or groups of employments. The fundamental tables of deaths differentiate between the white and colored, making a useful distinction. The analysis, however, gives no separate rates by occupations with distinction of race.

The analysis of Mr. King does not improve the reports of Dr. Billings; and, although the statement is made that "the classification of occupations used in the present census is the same as that employed in the Eleventh Census, except that it includes all reported occupations, whereas in 1890 it included only certain specified occupations," a careful examination of the facts does not support this contention. In the report of Dr. Billings detailed information is given for eighty-nine specific employments of males against sixty employments given by Mr. King. An addition, however, is made for the table of the Twelfth Census in that data are given for persons employed in "Other Occupations of this Class," by which the value of rates for groups of occupations is, of course,

enhanced. Conclusions based on groups of occupations, however, are generally misleading and of no practical importance. The tendency of recent times is illustrated in the improved decennial reports of the Registrar-General of England, being more and more toward detailed classification and information for specific trades and industries. Thus what is gained in one direction is more than balanced by the loss experienced in other directions; and important employments for which useful information was given in the Census of 1890 are, for reasons not stated, combined in groups, leading often to radically false conclusions.

Omitted Occupations Specified.

Stenographers and typewriters, wine and liquor dealers, nurses, undertakers, bleachers, bookbinders, brass-founders, coppersmiths, brick and tile makers, clock and watch repairers, jewellers and opticians, electrotypers, gas-works employees, gunsmith, locksmith, bell-hangers, harness and saddle makers, paper hangers, paper-mill operatives, photographers, potters, rubber factory employees, wheelwrights, fishermen and oystermen, pilots, quarrymen, telegraph and telephone operatives, and telegraph and telephone linemen are all omitted as specified occupations, and included in the occupations not specifically stated, or grouped with other and in a measure similar occupations. The list of omitted occupations has been given in full as an indication of the serious character and nature of the changes introduced, which certainly cannot be looked upon as an improvement of the census analysis.

Problem of Industrial Hygiene.

From the standpoint of industrial hygiene there are, for example, no more important occupations than potters and rubber factory operatives, for both of which occupations useful data are to be found in the census report for 1890; but no information is available on the basis of the Census of 1900.

Fishermen and oystermen form a group of well-defined laborers, with reference to which data are of considerable commercial importance; but they are included in the meaningless group of sailors, pilots, fishermen, and oystermen, representing certainly three well-defined groups of employments, all subject to different rates of mortality and specific disease or accident liability. Thus, for example, the comparative mortality figure for fishermen and oystermen, according to the Census of 1890, was 543, while for pilots it was 630, and for sailors 2,276. To combine such unlike employments into one group is merely to produce a figure which has absolutely no determining value. Another illustration is supplied by the combination of miners and quarrymen, two absolutely unlike occupations, especially from the point of view of accident liability. According to the Census of 1890, the comparative mortality figure of quarrymen was 469, while that for miners was given as 1,127; and to combine two such unlike occupations is again the mere production of a figure which has absolutely no determining value, but the use of which must lead to false and mischievous conclusions. It was reasonably to be expected that the census report of 1900 would materially increase the number of specific occupations dealt with in the section discussing the relation of occupation to mortality; but, as previously pointed out, instead of eighty-nine employments discussed in the Census of 1890, only sixty are dealt with in detail in the Census of 1900. To make this matter worse, the details are not given in the fundamental tables; but a vast variety of heterogeneous employments are grouped in a purely arbitrary manner, filling space to no advantage and resulting in conclusions of no practical value.*

Misleading Occupation Death Rates.

The first table of the occupation mortality analysis attempts to show the general death rates of males in sixty specified

* See "Scope and Method of the Twelfth Census: Critical Essays by Members of the American Economic Association," p. 502, paragraph 9.

occupations. Comparison is made with similar rates for 1890, which must have been specially calculated, since they are not in Dr. Billings's reports. Although the misleading nature of such comparisons must be evident to any one who has made himself at all familiar with the fundamental principles of vital statistics, a blunder which invalidates the utility of most of the earlier contributions to vital statistics is here repeated, and incorporated in a most important public document. Since no correction is made for the differences in age distribution in widely different employments, the published rates do great injustice to employments entirely healthy, while giving a favorable position to employments the health conditions of which are quite the opposite. This point is readily illustrated, if comparison is made of the mortality of farmers and printers, the former of which, according to the census, experienced a mortality "at all ages" of 17.6 per thousand against a death rate of 12.1 per thousand for printers. Hence, apparently, printers enjoy a much lower mortality than farmers. Of course, the very opposite is the case. The inaccuracy of the rates is the result of radical differences in the age distribution of the two employments, there being 11.5 per cent. of farmers at ages sixty-five and over, while among printers there are only 1.5 per cent. living at this age period. These facts are set forth in the following table, in which a comparison is made of the crude death rates and of the corresponding death rates for divisional periods of life: —

THE COMPARATIVE MORTALITY OF FARMERS AND PRINTERS (RATES PER 1,000).

	Proportion of Population at Ages 65+	*Crude Death Rates (all ages over 10)*	*Death Rates at Specified Ages.*			
			15-24	*35-44*	*45-64*	*65+*
Farmers	11.5	17.6	3.7	4.6	13.2	96.8
Printers	1.5	12.1	5.0	12.3	20.0	108.8

It is shown by this table that, while apparently the mortality of farmers was 5.5 per thousand higher than the mortality of printers, as a matter of fact, when the proper comparison is made, the mortality in this occupation is considerably below

that of printers at all periods of life. This illustration will suffice to show the misleading character of published rates arrived at by a faulty method, which, in view of all that has been written on this subject within the past thirty years, is inexcusable. The fact that rates, scientifically arrived at, are published in other portions of the analysis, does not detract from the force of this criticism; for, as previously pointed out, the census volumes are consulted as a work of reference by a large number of persons who cannot be expected to make a critical examination of all the rates and ratios published in different portions of the work.

Changes in Occupation Mortality, 1890–1900.

No explanation is given as to the probable causes of remarkable changes in the "crude" mortality rates for different occupations during the decade 1890–1900. Thus it is shown that the mortality of clergymen has increased from 18.2 to 23.5; of bankers, brokers, etc., from 4.7 to 11.8; of millers, from 17.3 to 26.6; of sailors, pilots, etc., from 22.0 to 27.7; finally, of stock raisers, herders, etc., from 19.4 to 32.1 per thousand. Remarkable decreases are shown for United States soldiers and sailors, the rate having been reduced from 22.7 to 12.1;* of boot and shoe makers, from 15.3 to 9.4; and of tailors, from 16.5 to 11.8 per thousand.† It is a very important

*According to an official statement of the Surgeon-General of the United States Army the death rate of the United States troops was 8.7 per thousand during 1890 and 22.7 during 1900, including troops serving abroad. The death rate of the United States Navy was 9.0 per thousand during 1890 and 8.9 during 1900. Of course there is a considerable difference between the mortality of the population classed as soldiers and sailors and that of troops and marines actually in service, and a still greater difference if inmates of soldiers' and sailors' homes are included in the census enumeration. But it is highly improbable and next to impossible that the mortality of the army and navy combined should have decreased from 22.7 to 12.1 per thousand during the ten years under observation. It would have been valuable to have added a table showing the mortality of the army and navy as determined by the service medical statistics for the decade 1890–1900; and a very useful table, readily obtainable, could have been added, showing by ages the mortality of inmates of soldiers' homes during the same period. Such a table would prove of considerable value in discussions of army mortality and pension problems. Unfortunately, the army and navy medical statistics are far from being as accurate, and sufficient in detail to be as useful, as the interests they are supposed to serve emphatically demand.

†This is probably the result of the influx of Russian and Polish Jews, who monopolize this trade and who more than balance the effect of an unhealthful occupation by an exceptional degree of vital resistance.

question as to whether this indicated increase in the mortality of the occupations named has actually taken place or whether the changes in the rates are merely the result of a more accurate and complete collection of the vital statistics.

For certain occupations it would have been better if rates had been entirely omitted, even though the actual data regarding deaths by ages and causes would still have been of value. Thus, for example, the mortality of commercial travellers and of nearly all the employments of women is evidently understated and for practical purposes misleading.

The second table of this section gives the necessary fundamental facts of population and deaths by occupations and age periods with distinction of sex. This table is of considerable value and illustrates points previously discussed, for the absence of such fundamental data materially impairs the value of all analysis. The method followed of giving the actual facts for each occupation specifically discussed is excellent, and should be employed in the discussion of every important problem of vital statistics in the different sections of the analysis. The age grouping adopted is not satisfactory in that the periods should have been for ten years instead of twenty at ages under sixty-five, and the ten-year subdivisions should have been carried forward until age eighty-five. For certain occupations, especially the most unhealthy, it is of importance to know the specific death rates at periods of life above the age sixty-five. The age period sixty-five and over is entirely too long, and twenty-year periods at younger ages are insufficient to establish the actual differences in the mortality rates of persons employed in different occupations. The method employed by the Registrar-General in his supplement to the fifty-fifth annual report on the mortality of England and Wales could have been followed to advantage; or the actual facts regarding population and deaths could have been given by ten-year periods, together with the corresponding rates.

But a more serious omission in the section on mortality by occupations is, however, the omission of ages at death and

corresponding rates of mortality per thousand living from specified diseases. A table is given for a number of specified employments, showing the mortality per hundred thousand from specified causes; but this table is misleading for occupations with a widely different age distribution. Thus, for example, the statement that the mortality from consumption among clerks and bookkeepers is 398.0 per hundred thousand against a rate of 182.2 for males in professional employments is, in all probability, misleading, since in the former the proportion of persons aged fifteen to twenty-four is 39.4 per cent. against 15.8 per cent. living at this age period among men in professional employments. In other words, the mortality from specified diseases possibly the result of occupation should be set forth by divisional periods of life in exactly the same manner as for the mortality from all causes. While such rates are not calculated in the reports of the Registrar-General, the fundamental data are given, making it readily possible for any one to compute the relative mortality from different causes in specified occupations. The omission indicated is a most serious one, and impairs very considerably the practical utility of the report in that the problems of industrial hygiene depend for their solution almost entirely upon accurate detailed vital statistics with due regard to divisional periods of life.

Omitted Important Employments.

As previously stated, no information is given regarding certain important occupations for which mortality data would have been of the greatest possible value. Thus, for instance, the reports contain no information regarding the mortality of potters, rubber-workers, match-workers, persons employed in the manufacture of explosives, paid firemen, etc., all employments sufficiently numerically represented in the registration area and for which accurate vital statistics are of great practical value. The main object in reports of this kind should be to

furnish information likely to be useful in scientific and social investigations undertaken to determine the health conditions of the population in recognized dangerous or unhealthy industries. The reports as published contain little information of this character either in the fundamental tables or in the final analysis.

The term "Others of this class" merely adds to the confusion experienced in the practical use of the tables published, since no information is given as to the different employments included under this meaningless and misleading term.

Combinations of employments have been made, resulting in rates which cannot be applied to practical purposes. Hotel keepers should not have been combined with boarding house keepers, since the former almost invariably engage in the sale of intoxicants, while the latter do so but very rarely. The same criticism applies to the grouping of saloon keepers with restaurant keepers, the latter being generally persons who do not engage in the handling or sale of intoxicating liquors. It is, no doubt, as the result of this grouping of employments that the reported death rates of saloon keepers, etc., are so favorable to this occupation, which, without exception, on the basis of more trustworthy data, is known to be an employment subject to an excessive mortality at all periods of life.* Sailors and soldiers of the United States should not have been combined, since the two groups are subject to different rates of mortality.† Brewers should not have been combined with distillers and rectifiers, since it is highly probable that the manufacture of malt liquors has a less serious effect upon health and longevity than the manufacture of distilled and spirituous liquors. Glass blowers and glass workers are misleading terms, since, as a matter of course, glass blowers are

* See "Transactions of the Actuarial Society of Edinburgh," vol. ii., Nos. 6 and 8 (1888), and vol. iv., No. 5 (1897), being essays on the mortality of persons engaged in the sale of intoxicating liquors. Published by T. A. Constable & Co., Edinburgh.

† During the five years 1891–95, during a condition of peace, the death rate of the United States army was 6.6 per thousand, and of the Navy 8.3 per thousand.

glass workers in every sense of the word. If a subdivision was possible, detailed information should have been given regarding blowers, which occupation is claimed to be subject to a higher mortality than other employments in the glass industry. It would have been a useful contribution to our knowledge of the subject if the mortality of glass workers had been stated by subdivisions; that is, for men employed in the manufacture of general ware, window and plate glass, the three main divisions of the industry, subject, unquestionably, to different rates of mortality. Miners and quarrymen are combined into one group, resulting in death rates which are entirely and radically misleading. As far as available information goes, the former are subject to a much lower mortality than the latter.* The information should have been given separately for metal miners, since the mortality rates of the two main branches of the mineral industry are also quite different. The inclusion of four distinct occupations into the group sailors, pilots, fishermen, and oystermen, leads also to conclusions entirely at variance with the actual conditions as they affect each of the specific employments. Thus, for example, the mortality of sailors is, without question, considerably in excess of the mortality of pilots and oystermen. Of stock raisers, herders, and drovers, represented as having experienced a mortality of 32.1 per thousand, it is stated that "the number of persons (966) and deaths (31) was so small that the rates have no significance." Since this is a self-evident truth, it would have been but proper to omit this occupation entirely from the analysis, and give in place thereof data regarding paid firemen (of whom there are about 15,000 in the United States), telegraph and telephone linemen (14,765), potters and earthenware workers (16,140), and rubber workers (21,866), all occupations subject to a special disease or accident

* At ages 45–54, for example, according to English data for the period 1890–92 the general death rate of all miners was 19.6 per thousand, and of quarrymen 25.3 per thousand. For coal miners alone the death rate at this age period was 19.4, for copper miners 24.3, for tin miners 33.2, and for lead miners 23.9 per thousand,— indications of quite considerable differences in the mortality and specific disease liability of men engaged in the mining of coal and the different metals.

liability, regarding which it would have been of great public value to have had accurate information.

Textile workers are reported upon under the title "mill and factory operatives," including in the aggregate 150,783 males and 162,392 females. It would have been of considerable value if this large group of widely different employments had been given at least by broad divisions of cotton, wool, and silk workers. It may not be out of place to add that an important contribution to our knowledge regarding the health of persons employed in the different branches of the textile industry is made annually in his reports by the medical officer of health of Blackburn, England. A similar useful contribution regarding the health of persons employed in the manufacture of cutlery as polishers, grinders, etc., is made annually by the medical officer of health of Sheffield, England, in his reports on the health of the city. The two reports referred to illustrate the usefulness of trained officials in reporting upon local sanitary conditions, supplementing observations by carefully compiled and intelligently analyzed occupation mortality statistics. The section on occupations, therefore, falls very materially short of what this most important branch of vital statistics could readily have been made if due consideration had been given to the real elements involved in the discussion. An exceptional opportunity of adding materially to a very limited body of facts regarding some most important industrial and medical problems was not made use of.

Part I: Fundamental Tables 1 to 28.

Table 1 gives the deaths by conjugal condition, by specified causes, color, age, sex, and birthplaces of mothers. The facts are given for the United States, the registration area and its subdivisions, for the non-registration area, and in detail for each registration State. A mass of needless data occupies seventy-three pages, which could have been reduced to less than one-third if a more critical treatment had prevailed.

As previously pointed out, the deaths of the "Single" are given at all ages and at ages under fifteen, including, as a result, infants and children outside of the conjugal state. Comparisons are, therefore, erroneous and radically misleading, if based on the first two columns, including the deaths at ages under fifteen. The two columns for "All ages" and "Under fifteen" should have been omitted, and the space gained could have been used to give the deaths by ten-year periods after sixty-five until age eighty-five. Thus the value of Table 1 would have been largely increased, while misleading and needless data would have been omitted. The heading of this table, "Deaths from Certain Diseases and Classes of Diseases," is inaccurate in that the causes of death specified include accidents, homicides, and suicides, which of course, properly speaking, are not diseases at all. The group "General diseases—A" could have been left out as serving no useful purpose, while deaths resulting from pregnancy could have been added in the space gained. It would have been of great value if full details had been given in this table of deaths by conjugal condition for all the more important diseases peculiar to women, since data of this nature are not obtainable from local or State registration reports. Cancer and tumor should have been given separately, and the cancer mortality should have been given by organs affected. The omission of this information and the previously pointed out omission of deaths, as the result of pregnancy, very materially impair the value of what would otherwise be an exceedingly useful contribution to vital statistics.

The deaths by conjugal condition are also given by birthplaces of mothers; but, since these deaths are for all ages, they are useless, since the "Single" include infants and children under age fifteen, and a comparison of the mortality of the single and married, the widowed and divorced, on the basis of birthplaces of mothers, would be radically misleading. To determine the possible relation of nativity to conjugal mortality, separate tables should have been given

for each of the twelve principal nativities specified in identically the same manner as this information is given for all nativities combined. All investigations of this kind, at least in their present state, aim to establish general principles; and for this object the data for the registration area as a whole would have been amply sufficient. More than two-thirds of the seventy-three pages are taken up with needless details for subdivisions of the registration area and the different registration States.

Table 2. The mortality by occupation is set forth in twelve tables, which take up one hundred and seventy-four pages. Here, again, the fact is ignored that present investigations into the mortality by occupations are entirely for the purpose of determining general principles; and for such investigations all details regarding subdivisions of the registration area, or information for the individual registration States, are of very small, if any, value. The fundamental distinctions are color and sex; and the former forms a useful addition to a very limited knowledge of the differential effect or the possible relation of race to occupation mortality. Unfortunately, no corresponding information is given regarding the population by color in the registration area for which the data regarding deaths by occupation are available, and hence no rates can be calculated. It is probably for this reason that the subject is not discussed in the analysis, but some reference to the subject would have been of interest. The method of giving full details for the colored by ages at death should have been followed with regard to at least twelve of the principal nativities. The data as given are useless in that the divisional periods of life are omitted. The general age distribution of deaths by occupation is defective in that the divisional periods end with sixty-five. The information should have been given for ages sixty-five to seventy-four, and seventy-five to eighty-four; and for these two additional columns space could have been found by omitting ages under fifteen and ages unknown. At ages under fifteen there were

only 2,834 deaths of males for which occupations were returned out of a total of 278,147, and the omission of this age group would therefore have been a matter of small consequence. The details are given for sixty specified occupations or groups against eighty-nine returned in the Census of 1890. If all the needless and meaningless tables for subdivisions of the registration area had been omitted, more than sufficient space would have been found to give complete details for at least one hundred specified occupations. The group "Others of this class" should have been made to include as few employments as possible, but it is here made to include 7.6 per cent. of the total number of male deaths reported by occupations.

There are twelve tables giving the mortality by occupation, with distinction of sex and color and full details for all the subdivisions of the registration area. First the data are given for both white and colored, then for the white and colored separately. The first of these three tables is needless, and it would have been more useful if instead the occupation mortality *rates* had been given for the white and colored population separately. What useful purpose it can serve to give occupation data for the United States, the registration record, the registration cities, the registration States and cities in registration States, the rural parts of registration States, the registration cities in other States, the non-registration record, and, finally, for all of the registration States separately, is beyond the comprehension of the writer, whose special work has been considerably in the direction of occupation mortality investigation.

While the first series of six tables gives the details by ages at death, the second series gives the details by causes in exactly the same manner; that is, by race, sex, and for the needless subdivisions of the registration and non-registration areas. The information is given for eighteen specific causes of death, or groups of causes, while additional data are given for cancer by five specified organs. Two unnecessary columns

are added, giving the deaths from "All other causes" and "Unknown causes." While the details of cancer data are of some value, they are less useful to those interested in occupation mortality statistics than information as to the different forms of accidents and injuries. The only sub-group for this most important branch of occupation mortality statistics is burns and scalds; while no reference is made to the mortality from mining accidents, railroad accidents, accidents by machinery, etc., all of which would have been exceedingly useful and of determining practical value. No information is given as to the mortality from lead poisoning, which, while a comparatively unimportant cause of death, is of very considerable importance in considering the specific disease liability of plumbers, painters, glass workers, etc. The column showing the deaths from suicide should follow "Other accidents and injuries," and not precede this group. The fundamental error, however, which underlies the construction of this table, is that the information is not given by divisional periods of life; and thus the data are of very little value, since the possible effects of occupation on health cannot be traced by crude data of this kind. The deaths should have been given for not less than twenty specified causes or groups of causes by occupation and divisional periods of life in the manner as the deaths have been returned from all causes, at all ages, in the first six tables of the series. A ready illustration as to how the facts should have been returned is, curiously enough, found in another portion of the census volume; namely, Table 17, showing the deaths from cancer of males engaged in various occupations with distinction of age. This table, which will be referred to in the proper order, is one of the very best, from a technical point of view, which appears in this census volume. It gives real facts of real value in exactly the manner most useful for practical purposes; and the divisional periods of life are returned by thirteen specified groups of ages, amply sufficient for most purposes, although ages seventy-five and over could have been subdivided, and the

terminal period of life could have been made eighty-five and over by omitting the needless column of "Unknown." If the meaning of the criticism of numerous tables in the census report is not readily intelligent to the reader, reference should be made to Table 17 on page 277 of Part I. Tables such as there given for cancer should have been given for all specified occupations, and not less than twenty causes and groups of causes of death instead of the meaningless and misleading tables of aggregate mortality by subdivisions of the registration and non-registration areas. The adoption of these suggestions would reduce the space occupied to two-thirds, or perhaps one-half; while the practical value of the work would be very materially enhanced.

There are few subjects of greater practical importance before the American public at the present time than the problem of industrial hygiene, and it is a sorry fact that nearly all our knowledge regarding the diseases of occupation is derived from English or Continental sources. The treatment of the subject in American medical works, by American writers, is entirely inadequate; and a painstaking investigation, covering ten years of issue of two leading medical journals, has proven to the writer the almost complete absence of useful contributions by qualified medical experts to our knowledge of occupation mortality. The only creditable exception to the general indifference to this subject is found in the State of New Jersey, where the State Board of Health and the State Bureau of Labor Statistics have, at different periods, published exceedingly useful investigations on the mortality of persons in the different important industries of the State. What can be done on even a very limited scale in this direction is shown by the results of an occupation inquiry made by the State Bureau of Labor Statistics of New Jersey during 1901 into the health conditions of men employed in hat manufacture and glass works. Useful information, although quite difficult of analysis, is to be found in the reports of the Bureau of Labor Statistics for 1889–95, where the trade life

of workingmen is reported upon in considerable detail. The same criticism of general indifference to industrial hygiene applies to the reports of factory inspectors, which are of comparatively small practical value in contrast to the extremely interesting and valuable reports of the factory inspectors of the United Kingdom. The best work possible in this direction cannot be done until the national vital statistics relative to the mortality by occupation are reconstructed and made to conform to the demands of the specialist, who is in a position to make practical use of the data collected.

The details regarding the mortality from cancer are given in Tables 14–18; and in many respects this contribution to our knowledge of an exceedingly complex, interesting, and important subject is a most useful addition. The subdivision by ages, as has been already pointed out, is excellent in that the facts are given for thirteen divisional periods of life. Since most of the cancer mortality falls on the adult ages, more minute divisions of age periods after forty-five are of great value. The usual criticism applies to this table,—that needless information is given with regard to subdivisions of the registration area, which can hardly serve a useful purpose.

Table 15 gives the mortality from cancer by conjugal condition, and the table is properly limited to the registration record. It would have been of interest if the facts had been given regarding the Chinese, Indians, and Japanese, since we know practically nothing of the occurrence of cancer, by age and organs affected, among these elements of our population.

Table 16 gives useful details of the mortality from cancer by organs affected, but a most unfortunate and serious omission is made in that the conjugal condition was not considered. As elsewhere pointed out, the conjugal condition is no doubt, in a measure, connected with special forms of cancer, particularly among women; and other data could have been much more readily omitted than this important aspect of a most important problem. Space for this additional information could readily have been found by omitting the deaths for cer-

tain unimportant organs, as, for example, cancer of the brain, causing only twenty-seven deaths, and cancer of the eye, causing only eighteen deaths, in the entire registration area.

Tables 17 and 18 show the mortality from cancer by occupation with distinction of sex and divisional periods of life. Having already been referred to, they require no further discussion.

Table 19 is really the fundamental table of the census, and should have been given immediately after the analysis. The table shows the "Population, Births, Deaths, and Death Rates at Certain Ages and Deaths from Certain Causes by Sex, Color, General Nativity, and Parent Nativity." This table takes up two hundred and sixty-nine pages, which contain a mass of exceedingly useful information. The arrangement of the first part of the table, giving the mortality by ages, is faulty in that deaths at "All Ages" should precede deaths at "specified ages." The table illustrates the great possible usefulness of the census vital statistics, provided proper attention is given to details, and fundamental facts regarding population and deaths are given to the public. The age grouping adopted is under one and under five. No explanation is given why the facts for other divisional periods of life were not published in the same manner, since the data would have been of the greatest possible value. Most of the objections to the faulty tables and more faulty analysis would have been met by a rearrangement of this table on the basis of at least six divisional periods of life, including in each case, for each State, with distinction of sex, color, nativity, etc., the facts as to population and mortality at different periods of life. The six divisional periods could have been 0–1, 1–4, 5–14, 15–44, 45–64, 65+. If these divisional periods of life had been given, a double page would have been necessary; but sufficient space could have been found for the additional data by omitting needless data in other portions of the two volumes. Part of the table is taken up with a return of deaths by seventeen

specified causes or groups of causes. Since this information is given in the aggregate, without distinction of age, the data are of very limited practical value. It is but proper to add, however, that to give this information by ages would have taken up a very considerable amount of space. Still, it would seem that, if proper discrimination had been used and large periods of life had been adopted, information of practical value could readily have been given. For example, diseases of children could have been returned for the population at ages under fifteen; diseases of middle life, such as typhoid fever, consumption, etc., could have been given for ages fifteen to forty-five; while diseases affecting older ages could have been given for forty-five and over. No corresponding rates need have been calculated, since for special requirements the original data would have been sufficient, provided both population data and death by age periods had been published. The number of diseases classified is inadequate in that two columns for "Unknown causes" and "All other causes," as well as "Old age" (which is a meaningless term), take up space which should have been given to other important causes of death. The space could have been used for suicides and accidents and injuries. The arbitrary disease classification is once more made apparent by the position given to diseases of the nervous system, which follow diseases of the liver and precede diseases of the urinary organs,— a position which is entirely out of harmony with the general principle adopted in the census volumes and any recognized system of disease nomenclature. Heart disease is combined with dropsy,— an antiquated method for which a proper explanation is wanting. In the Massachusetts registration reports, dropsy is given in connection with diseases of the urinary system; but, since in the general disease classification the position of dropsy is in the group of "General Diseases — D," it should not have been combined with heart disease, and thus give in combination a specific cause of death with an indefinite one. Table 19, however, is one of the most useful in the census

volumes, and one which, for purposes of reference, will prove quite valuable. It may be added that useful rates for the adult population can be worked out by subtracting the deaths and population under five from the deaths and population at all ages. The rates will be found useful, especially for cities where local mortality conditions are materially affected by race and nativity.

Tables 20–28 are termed "ratio tables," although the three first are "rate tables" giving the equivalent mortality per hundred thousand of population. These tables have already been referred to in the review of the analysis, and space is not available for further detailed discussion. The principal objections are against the headings, which are not sufficiently intelligent and at times misleading. It would have been desirable to have added the words, "Read from left to right" or "downwards," as the case might be, to assist those not thoroughly familiar with different methods of presenting the results of such investigations. A brief textual explanation of the method used, with possibly an example, would have been of great value; and a precedent for the adoption of this suggestion will be found in Population, Part I, Table 41. Such explanations as there given regarding the nature, objects, and possible intricacies of the table, should have been added in each case where the methods or results are likely to be misunderstood.

Table 25 is an exceedingly useful one, if properly employed; and the divisional periods of life are given in full to age ninety-five and over. It is a matter of serious regret that the corresponding information regarding the population in the registration area was not also given to the public.

Tables 27–28 give the proportion of the aggregate population at each specified age per hundred thousand of population at known ages. These tables are quite useful for purposes of reference, although similar facts are available in the population volumes. It would have been more useful if, in place thereof, information had been given regarding the population of the registration area with full details regarding sex, color, general

nativity, and parent nativity. For the entire registration area a table should have been given for the population by single ages, and corresponding information should have been given for the mortality. Such a table has never yet been introduced into the census, and its introduction into local health reports is exceedingly rare.* There would appear, however, strong reasons for the introduction of such tables into future reports, since, for a variety of purposes, details of population and deaths by single ages are exceedingly valuable; and, as long as no rates are calculated, the results are not likely to mislead the general public. The facts are principally of value to those who are interested in the construction of life tables and investigations as to the possible misstatement of age and the approximate accuracy of registration returns or who for special purposes may require age groupings other than those adopted in the general text.

Part II: Fundamental Tables 1 to 13.

Part II of the report contains thirteen fundamental tables, of which the first gives information relative to "Population and Deaths by States and Territories at Each Census, 1850 to 1900." This table is likely to be consulted by many persons not generally interested in the details of the census investigation; and any possible conclusions derived from this table must needs be misleading, since as stated in the Introduction (Part I, p. xii), previous to 1880 only enumerated deaths were returned,† and any possible conclusions based on the earlier returns must of course be misleading,

*See Table No. 9, Joseph von Körösy's "Die Sterblichkeit der Stadt Budapest," Berlin, 1901.

† This statement is incorrect; for Kennedy, in his preliminary report on the Eighth Census, page 24, states as follows: "The deaths in nearly all of the principal cities are annually registered and reported chiefly in connection with the boards of health. Whenever the deaths could be more correctly ascertained from these local records, the census marshals were authorized to copy them. But on examination they appear to have rarely availed themselves of the privilege, with one large exception, mentioned below. . . . In Massachusetts such an organization is in successful operation, and our marshals appear in this instance to have resorted to the State registry. The resulting proportion of deaths exhibited in the foregoing summary is noticed to be relatively greater in Massachusetts, but the disparity will be rightly ascribed to the better conditions under which the permanent registry operates rather than to any marked difference of climate compared with that of the adjoining States."

and not comparable with the returns for later years. No textual explanation accompanies the tables in this volume, although some explanation proves necessary in nearly every case to avoid erroneous conclusions.

The second table is of a similar character, showing the mortality by sex in each State and Territory since 1870. This table is also very likely to be improperly used; and, while of value as a matter of record, it should have been accompanied by some textual explanation.

The third table shows the deaths in each State and Territory by color and race for the census year of 1900; and, while of value for purposes of reference, it should have been accompanied by a few explanatory remarks calling attention to the untrustworthy character of the returns for non-registration States. It is not stated why information regarding deaths in Alaska was omitted. If the data were not collected, this fact should have been indicated by a foot-note.

Table 4 gives the deaths by color, general nativity, parent nativity, and sex for States and Territories, and registration cities. It would have been more useful if information regarding the colored population had been given in detail, showing the deaths of negroes, Chinese, Indians, and Japanese separately.

Table 5 gives the fundamental data regarding the mortality in States, Territories, and registration cities by age periods with distinction of sex. This table is an exceedingly useful one, but its value would have been very materially increased if the deaths had been returned by color and foreign parentage. By omitting a number of less necessary tables, space could readily have been found for the practically indispensable data regarding the mortality by age and race for cities having a large negro population.

Table 6 gives the deaths at each age by sex, color, general nativity, parent nativity, and birthplaces of mothers. This is a most useful and important table, which is subdivided into sections, first giving data for the country as a whole,

then for the registration record by subdivisions (some of which, however, are not necessary), followed by detailed information regarding the mortality in different States, both registration and non-registration. This table is very useful, and in combination with preceding tables the data would have been of the greatest possible value if the corresponding information regarding the living population at different periods of life, with due regard to sex, color, nativity, etc., had been given in the aggregate for the registration area, and perhaps for the registration cities.

Table 7 gives the deaths from each reported cause by States, State groups, and registration cities. This table is useful for reference in that the deaths from different causes are given in alphabetical order; but some textual introduction should have been added to caution the reader against possible errors of judgment in that closely related diseases, under alphabetical headings, are necessarily given in different parts of the tables. The alphabetical arrangement could have been improved in some instances, as, for instance, in the classification of rupture of the bladder under the letter "R," where it, of course, is not likely to be found without careful scrutiny of the entire table, the assumption being that it would be given under letter "B," with the qualification following the word "Bladder." The mortality from suicide is given in six subdivisions, whereas it could have been much more conveniently combined into one group. This subdivision of suicide, according to method, is carried through all the census tables, leading to a very considerable waste of space and the needless computation of a large number of rates and ratios. This necessitates in all general considerations of the subject a rearrangement and recomputation of the necessary proportional equivalents. The same blunder was made in the census reports of 1890, proving a source of considerable annoyance to those who make use of the data. In other words, method in suicide is a very subordinate element compared with the aggregate mortality from this cause, which is no-

where stated in the census exeept in Section XII of the analysis. Since no such elaborate details are given for any other cause, excepting cancer, it seems rather curious why the facts should have thus been given with regard to suicide. Accidents should have been given in their alphabetical arrangement under letter "A," with due regard to the subdivisions of this group of causes; but this, unfortunately, has not been done, and any one wishing to ascertain from this table the aggregate mortality from accidents and injuries must first extract, with no small difficulty, the different items under which the returns for this group of deaths are given. The elaborate subdivisions adopted for this table regarding States, State groups, and registration cities, is hardly necessary in view of the very small number of deaths reported for a large number of the 219 specified causes.

It would have been desirable to have had some textual explanation as to the method adopted in classifying deaths reported as having been due to different causes. Certainly, not less than 5 per cent. of all the deaths returned to registrars are reported as due to more than one cause; and, the subject being one of very considerable interest to those who aim at accurate registration, the method adopted by the Census Office would have been of interest and value. This table takes up 110 pages, whereas it could readily have been condensed into one-fourth of this space.

Table 8 shows the deaths in the United States, in the registration area, and in each State and Territory by groups of diseases. The unscientific nomenclature of diseases follows the Eleventh Census, although not in general use, and discarded by Mr. King in the introductory part of Vital Statistics, Part I. Mr. King there states that in future publications the Bertillon classification will be adopted, but he gives no reason why the method was continued in the present reports. This table is very useful for a variety of purposes, and can readily be employed in special investigations by the recalculation of ratios per thousand deaths at specified periods of age.

Table 9 is identical in construction with Table 8, the deaths are given only for the United States as a whole, with distinction of color. This table is limited to the white population, the colored population as a group, the Indians and the Chinese; but it would have been a useful addition if separate data had been given for the negro population and for the Japanese, even though for the latter the number of deaths recorded in the entire United States, according to Table 3, was only 117. Since definite conclusions are advanced regarding the mortality of the Japanese in Section VI of the analysis, it would seem but proper that the necessary fundamental data from which the conclusions were arrived at should have been given to the public.

Table 10 is also identical with Table 8 in that the mortality by age and cause and classes of deaths is given by color and race for the registration area. Here, however, the information is given only for the colored as a group and for the Chinese, data regarding the Indians and Japanese being omitted. It is true that the total number of deaths of Indians in the registration area was only 319, and of Japanese 86; but since the deaths in these populations were given in Section VI of the analysis, and death rates from certain causes by race, with corresponding reflections upon the high mortality of Indians from consumption and the low mortality of Japanese from this disease, it would have been but proper to have given the fundamental data from which the conclusions were derived. As elsewhere stated, no corresponding information regarding the Chinese, Indian, and Japanese populations of the registration area by age periods is given in the fundamental tables of the population volumes; and it is therefore impossible to calculate accurately the mortality of the three races for the purpose of scientific comparison with the mortality of the white population.

Table 11 gives in elaborate detail, with proper distinction of age periods, the mortality of white persons in the registration area by birthplaces of mothers. It is not stated

why this information was not also given for the United States; but the table as given is a very useful one, and a valuable contribution to our very limited knowledge regarding the mortality of the population of foreign parentage in this country. Conclusions regarding the mortality of the foreign born are misleading unless based upon rates derived from the living population at different periods of life, since the foreign born are mostly of adult ages. It is therefore of the utmost importance to consider the mortality of the American population on the basis of parentage; and it may not be out of place to add that this fundamental principle was first recognized by Dr. Snow in the registration reports of Providence, R.I. A useful subdivision could have been introduced by giving separate returns of the mortality of persons whose mothers were of French-Canadian birth in distinction from those who were of English-Canadian birth. The mortality of the two elements of the Canadian population is radically different, the former being subject to a very high death rate of children under five years of age, while the latter enjoy a comparatively low mortality at this period of life, while for both elements the mortality is low at adult ages.

An unfortunate omission is the mortality of the Portuguese, as this nationality forms a considerable portion of the populations of Massachusetts, Rhode Island, and California, far more so, for example, than the French population, since there are in Massachusetts only 3,905 persons born in France against 13,453 persons born in Portugal. A very useful distinction is made between the mortality of persons of Russian and Polish parentage; for the mortality rate differs quite considerably, and the two nationalities should never be combined, no more than Hungarians and Bohemians, two other nationalities subject to different rates of mortality at different periods of life.

Table 12 gives general information regarding deaths from specified causes and groups of causes in registration States by

birthplaces of mothers, but without distinction of age. This table is one of very limited usefulness, and the thirty-five pages necessary could readily have been reduced to less than ten if only the more important causes of death had been given in detail.

Table 13 gives the deaths in the United States, in the registration area and its subdivisions and in each grand group, from certain diseases at certain ages and from certain specified diseases and classes of diseases by months, with distinction of sex. This table takes up 174 pages; and, if anywhere in the census volumes there is extravagant waste of space for needless purposes, it is in this table, which, at its very best, can only have a very limited degree of public utility. It would have been fully sufficient to have given this information for the United States as a whole, and at most for the registration area, instead of giving all the information in elaborate detail for every possible subdivision by groups and grand groups of the entire United States. This table illustrates forcibly, perhaps more than any other evidence quoted, the non-critical nature of the supervising authority in charge of the division of vital statistics.

Not only is the table faulty in itself in that the age grouping, for instance, is unsatisfactory; but it gives other evidence of an absence of critical and careful supervision. Generally, three age groupings are given, to which is added a line showing the mortality at unknown ages. Of these there are about twelve to a table, all pertaining to an absolutely non-essential aspect of the general problem. It is not going too far to say that one-fourth of the space of almost three hundred pages is wasted for an entirely needless purpose. However necessary a statement of unknown ages may be in the original tables as compiled in the Census Office to act as a check on the accuracy of the original tabulation, it does not appear necessary that this information should be given in the published fundamental tables and made to oc-

cupy about one-fourth of the entire space. The age grouping generally adopted is under five, five to fifty-nine, and sixty and over. Since for all general census purposes the age grouping at adult periods ends with sixty-five, it would have been more desirable to have done so here; while a fourth age group, fifteen to twenty-four, could have been added to take the place of the line now occupied by data for unknown ages. In some instances different age groupings are adopted without, apparently, much discrimination. As further evidence of the needless waste of space in this elaborate table, it may be pointed out that the mortality from accidents and injuries is given by months and sex in all the different grand groups or regional divisions of the country, for all minor subdivisions, including suicide, with distinction of method, making it possible, of course, for the curious to learn how many deaths from suicide by drowning occurred in grand group 3 during each month of the year and at different periods of life. Since there was only one death from this cause, and this death occurred in June, being that of a male, probably the curiosity is satisfied. But, when such a detailed analysis, serving no possible practical purpose, is carried through almost two hundred pages of the census volume, it is a waste of space and opportunity with which those who require the volumes for practical purposes can have little patience.

Mortality Data by Single Years of Life.

Instead of publishing a mass of unnecessary details likely to prove of possible value only in extremely rare cases, there should have been published a fundamental table of American mortality, showing for each single age of life the number of deaths enumerated and registered, first for the entire United States, second for the registration area, third for the non-registration area. This table should have been supplemented by tables of deaths by single ages, with distinction of sex, color, and nativity; but such a table need only have been

given for the registration area, for which the corresponding population data should have been published. Population volume, Part II, contains such tables for all the States; but by an unfortunate oversight the data regarding deaths by single ages for registration States were not given to the public. Such tables, aside from the fact that they make possible combinations or groupings other than those adopted in the analysis, serve the further and still more important purpose of affording an indication of the accuracy of age statements as affected by race, nationality, and registration mortality. It is to be hoped that the forthcoming annual volume will contain such a table for the registration area as a whole and with due consideration of race, showing separately the mortality at individual ages and groups of ages for the white, negro, Chinese, Japanese, and Indian populations. Such a table would certainly serve a far more useful purpose and occupy less than one-twentieth of the space given to wholly unnecessary details of the mortality by months from different causes and at different ages in the twenty different regional divisions of the United States.

Conclusions.

Vital statistics have a value which cannot be measured in monetary terms. They exhibit from year to year, from decade to decade, the health progress of the nation; and in numerous other ways they serve as an index factor of social and economic progress. Vital statistics, more than any other statistical data, enable the careful student of social and economic tendencies to establish evidences of progress and decay; and, in recognition of their great value, national, State, and municipal governments have expended large sums of money in the collection and registration of births, marriages, and deaths. If in a large measure it is true today, as pointed out by De Bow in 1855 in his volume on the vital statistics of the Seventh Census, that "it is more easy to

satisfy mankind of the value of any other branch of statistics than that which relates to the numbers which die in any period, their ages, sex, occupation, condition, and nativity, and the causes which produce such deaths," it is almost entirely because there has been practically no public education in the elementary principles and in the scientific use of such data. Although physicians make frequent use of vital statistics, and although most contributions to medical and surgical literature abound with statistical tables, the evidence is overwhelming that few medical practitioners and sanitarians have a clear recognition of the statistical method and the relative value of the different statistical elements, which may properly be laid down as a most serious defect in the teachings of modern medicine.

Numerous illustrations can readily be furnished to prove this general ignorance of even the most simple elements of vital statistics. Thus, for example, Elihu Root, in his report as Secretary of War for the year 1899, commits himself to the view that "the significance of the annual *rate of death* from disease in the Philippines (17.2 per 1,000) may be better appreciated by comparison with the rates *in* some of our well-known American cities." (The italics are mine.) Mr. Root gives a table showing the annual death rates of Washington, Boston, San Francisco, etc., together with the mortality rate from disease of soldiers in the Philippines. Even a moment's reflection would have made it clear to Mr. Root that a comparison of the death rate of soldiers, mostly of ages eighteen to thirty, could not properly be made with the mortality of the general population at all ages. Even a comparison with the general death rate of cities, at ages fifteen to forty-five, which, according to the then available census of 1890, was 10.9 per thousand, would not have been accurate in that soldiers represent a carefully selected class of physical risks in contrast to the general population, which includes the sick and otherwise physically impaired. The only accurate method of comparison which could have been

suggested to the Secretary of War by the Surgeon-General of the army would have been the average mortality rate from disease of soldiers in the United States army previous to the war with Spain. But by this method the argument advanced by Mr. Root could not have been proven for, according to the annual reports of the Surgeon-General, the mortality of soldiers from disease during the five years, 1891–1895, was at the rate of 4.3 per thousand, while during 1896 the rate was 3.8, and during 1897 it was 3.1. In other words, the mortality of soldiers in the Philippines from disease was four times as great as the mortality from disease of United States soldiers under conditions of peace.

A similar misleading comparison, made for the same purpose of proving the loss of life in our military operations to have been of comparatively small importance, is furnished by an extract from the *Medical Record*, printed in the New York *Sun*. The statement is to the effect that "the death rate of the troops in France amounts to 6.1, in Algiers to 12.3, and in the colonies to 42.95 *per cent.*" France has serious problems of fecundity and mortality and complex problems of colonization, but the nation is at least fortunate enough not to lose almost one-half of its army in military operations in the colonies during a single year. It is not necessary to point out that the rate quoted is not per cent., but per thousand. This, however, evidently escaped the writer of the article, who remarks that, "when we compare these statistics of an army at peace and those of the mortality rate among our own soldiers in the war with Spain, which was something like 2 *per cent.*, it is only fair to ask whether the great outcry against the excessive death rate in our army is wholly warranted." As a matter of fact, a death rate of 2 *per cent.* in our own army is equivalent to 20 per thousand, which is five times that of a normal army death rate of 4 per thousand.

That such abuses of the statistical method are not at all infrequent, it is hardly necessary to point out; but a few more

illustrations may not be out of place in this statement of the evident need of a more scientific and common-sense method of dealing with the nation's vital statistics. Under date of Oct. 10, 1901, the New York *Sun* contains a despatch from Washington relative to a report of General Wood, then commanding the department of Cuba, to the effect that "the *percentage* of loss was 1.25 per thousand." This statement is equivalent to a request at the grocer's for a quart of molasses at 16 cents a yard. Yet the New York *Sun* prides itself on its accurate use of good English. There is evidently room for a great improvement in the accurate and proper use of rates and ratios determined by the statistical method.

In a still more recent issue of Aug. 26, 1902, in a leading editorial on self-destruction, itself full of fallacies, misleading data and erroneous conclusions, the *Sun* remarks that, "according to the most authoritative of recent statistics of suicide, the country in civilization *where the rate per thousand living is greatest* is Saxony, with 31.1 *per cent.*, while in the United States it is only 3.5 *per cent.*" As a matter of fact, the rates quoted are per hundred thousand, and the term "per cent." is as radically misleading as it is completely misunderstood by the writer of the editorial. Since the general average rate of mortality from all causes in the United States is not as high as 2 per cent., a suicide rate of 3.5 per cent. would be an unheard of intensity of self-destruction. These illustrations of the abuses of the statistical method, especially in the direction of mortality data, emphasize the need of public education, which can only come about through a more scientific treatment of the subject on the part of those who have charge of the tabulation and analysis of municipal, State, or national health reports. As long as it is possible to arrive at absolutely opposite conclusions on the basis of rates published by the authority of the national government, the general public cannot be seriously found fault with for similar errors.

While in England medical officers of health are usually

graduates of distinguished universities, and graduates of a special course on public health matters, giving the right to the title "doctor of public health," in this country the registration of vital statistics and the supervision of local health matters is as likely to be intrusted to a civilian as to a physician, but in either case generally to one who has given but very little time and thought to the larger and more important problems of public health. This is made evident by an examination of the large number of public health reports published for American cities, which, while, generally speaking, may be satisfactory as regards public health matters from the point of view of sanitary administration, fall lamentably short in the direction of a careful study of the local mortality experience as affected by race, parent nativity, and occupation. Most of the official references made to the vital statistics are entirely perfunctory, and the disease classification adopted is usually crude, while, if ages at death are given at all, they are generally given by arbitrary divisional periods of life. Thus the comparison of the health conditions of one community with another is difficult and quite often impossible, while for any given community it is next to impossible to determine accurately the specific importance of different mortality elements or the specific mortality at different periods of life. Often numerous tables will be given, showing the mortality in great detail by months, — a factor of comparatively small, if any, importance, regarding most of the diseases; but with only very rare exceptions is any information whatever published regarding the mortality by occupation, — a most important factor, especially for large manufacturing communities. A thorough analysis is rarely attempted, accurate rates on the basis of population by divisional periods of life are seldom calculated, and conclusions of the most misleading nature are advanced, while the real value and importance of vital data is lost sight of. These, then, are the general reasons why vital statistics are not appreciated by the general public to the extent that would be

desirable, and hence the importance that such contributions as are made by the Census Office to this branch of scientific inquiry should bear the stamp of greatest ability and absolute accuracy.

It is a matter of sincere regret to the writer that the census volumes on vital statistics should in 1900 have fallen so far short of what the general public, in view of the vast importance of the subject, had a right to expect. To those who are compelled to make use of published statistics on public health, the defects of the volumes, as pointed out in this review, must needs prove a most serious hindrance in connection with special mortality investigations. Human life has a value which cannot be measured in financial terms, but the courts have found no difficulty in fixing an approximate valuation on life prematurely ended as the result of violence or negligence. A needless death from typhoid fever at the age of twenty, resulting from an impure water supply, as the direct result of criminal municipal negligence, is not merely measured by the usual estimate of $5,000, but is far more accurately measured by the expected after lifetime, which for a man at twenty would be represented by about forty years. If, then, as the result of a more careful and scientific study of vital statistics, it is possible to set forth clearly that the great waste of life, of which we are all in a measure aware, can be diminished by measures tending to prevent accidents or the unnecessary prevalence of disease, the social and economic value of vital statistics will become quite readily apparent to the general public.* The census is a costly undertaking; and the American people, who pay liberally for investigations of this kind, have a right to insist that they shall not be imposed upon by a mass of misleading statistics and conclusions published under government authority as a contribution to science.

*See "An Address [by the writer] on the Practical Use of Vital Statistics," published in the "Proceedings of the New Jersey Sanitary Association" for 1900, pp. 60–72; also, a paper on the "Need of Accurate and Uniform Social Statistics," published in the "Proceedings of the First New Jersey Conference of Charities and Correction," 1902, pp. 104–110.